# COMMERCIAL FISHERIES Review

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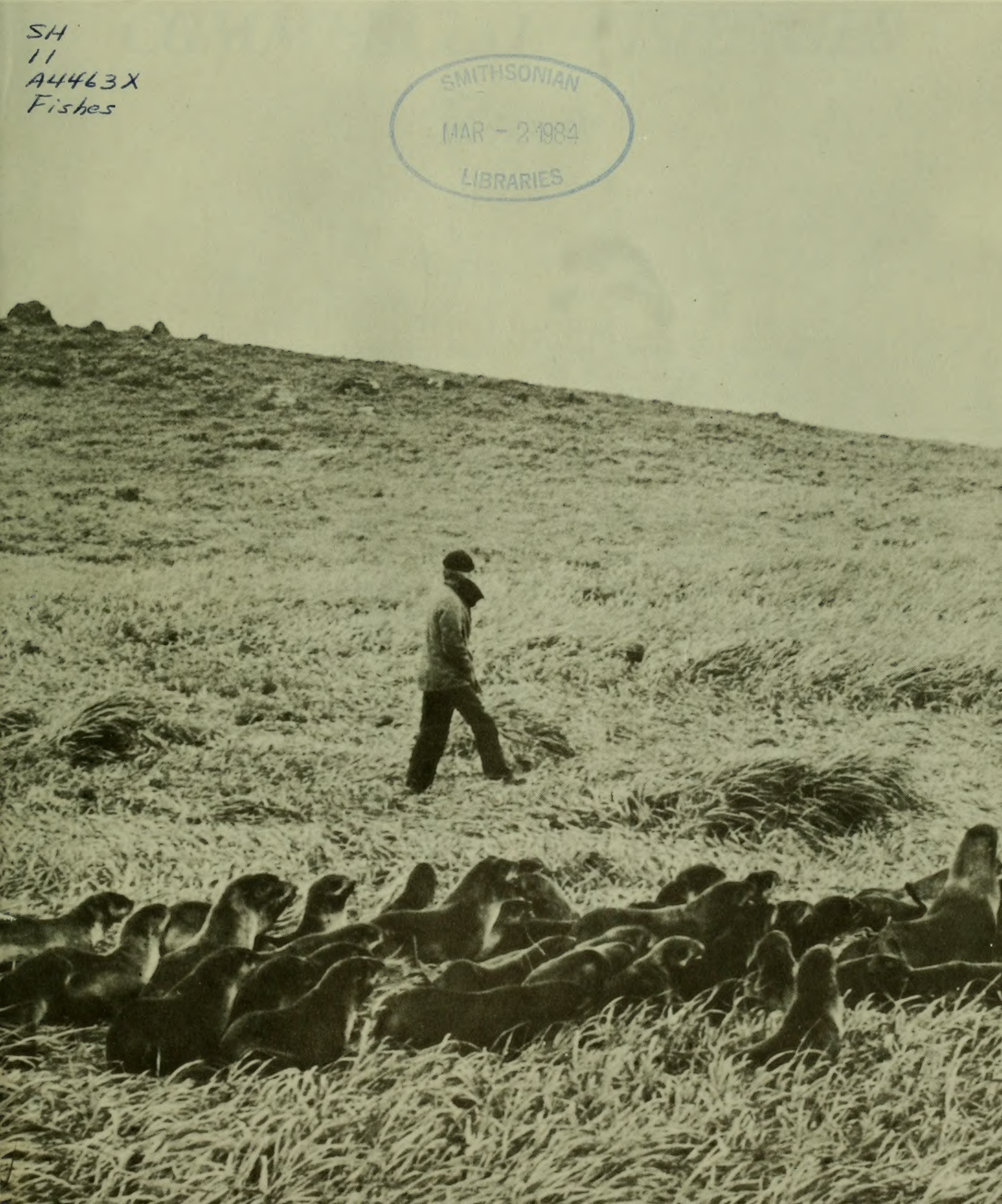


COVER: Fur seal herd being driven along a Pribilof island in Bering Sea, about 300 miles off Mainland Alaska.

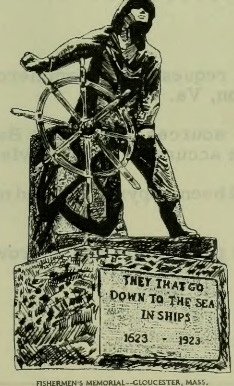
The seals come ashore in late May-early June before snow has melted. The young are born each summer. In the fall, after breeding season is over, seals return to sea.

The Alaska herd, an estimated 80% of world's fur seals, has about $1\frac{1}{2}$ million animals. Since 1939, about 69,000 skins have been taken each year. (Photo: V. B. Scheffer)

# COMMERCIAL FISHERIES

# Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.



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Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor),
Mary Andrews and Mary Donaldson

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209.

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# CONTENTS

Indians carrying bags of salmon along Columbia River. (Photo: USIA in National Archives)

# U. S. AND USSR AGREE ON SOVIET FISHING OFF U. S. MID-ATLANTIC COAST

On Nov. 25, 1967, the Soviet Union and the United States reached a 1-year Agreement on Fishery Problems in the Western Areas of the Mid-Atlantic Bight. These are the waters extending from Cape Cod. Mass., to Cape Hatteras, North Carolina.

The Soviet Union agreed to reduce its fishing effort. The U. S. agreed to permit Soviet fishing in a limited area within the 9-mile contiguous zone of the U. S. off Long Island--and Soviet loading in a limited area off New Jersey when it would not conflict with U. S. sport and commercial fishermen.

The 12-member U. S. delegation was headed by Ambassador Donald L. McKernan, Department of State, and included representatives of industry, Coast Guard, and the Bureau of Commercial Fisheries. The Soviet delegation was led by Vladimir M. Kamentsev, First Deputy Minister of Fisheries, and included 10 officials of the Soviet Ministry of Fisheries. The U. S. experts consider the 1-year accord an experimental step in international fisheries agreements.

McKernan's Statement of Problems

In explaining the problems of U. S. fishermen, McKernan pointed to the sharp declines in U. S. landings of red hake during the past 3 years. In southern New England fishing ports, landings of red hake decreased from 59.4 million pounds in 1965 to 10.8 million in 1966--down 81 percent. He said: "As far as U. S. fishermen are concerned, this important fishery has virtually disappeared, with severe economic consequences for the Americans. Landings of whiting or silver hake remain far below what we consider normal. Our studies indicate that abundance has diminished to a remarkably low figure." Other fisheries causing concern are scup, fluke, and other flounders.

McKernan concluded: "The United States remains one of the strongest supporters of the concept of freedom of fishing on the high seas with reasonable regard for the interests of local coastal fishermen in areas where distant-water fleets operate . . . . We must show by concrete example to the nations of the world, whose coastal fishing is adversely affected by high-seas fisheries, that they can cooperate with nations conducting these high-seas fisheries in reaching mutually satisfactory solutions and that in fact such solutions are preferable to drastic actions of a unilateral nature. I think that our two countries have been the leaders in recent times in reaching cooperative solutions to common fishery problems."

WHAT AGREEMENT PROVIDES

- The Soviet Union will refrain from fishing during Jan. 1 to April 1, 1968 in a large rectangular area about 46.5 miles wide and over 100 miles long south of the eastern half of Long Island. The area encompasses about 4,600 square miles. This will permit large concentrations of Atlantic red hake and whiting to reach their spawning grounds undisturbed.

[Some U. S. scientists believe the Soviets have been intercepting hake on the high seas where they concentrate early in the year before moving inshore. This limitation on Soviet fishing should provide U. S. fishermen a somewhat greater access to this resource and may alleviate their present economic difficulties.]

• The Soviet Union will not increase its 1968 catch above 1967 catches in the Mid-Atlantic Bight south of sub-area 5 of the International Convention for the Northwest Atlantic Fisheries (ICNAF) and north of Cape Hatteras. These are the waters west of meridian 71°40' as far as Cape Hatteras; meridian 71°40' runs across Block Island south of Rhode Island coast.

[This measure will bring some relief from increasing foreign fishing pressures on U. S. inshore fisheries. Intensive Soviet offshore fishing has resulted in increasing catches of species important to U. S. coastal fisheries.]

In addition, the Soviets will not conduct "specialized fisheries" for scup (porgy) and fluke in the Mid-Atlantic Bight. Also, they will not increase the incidental catches of those species.

[In the past, Soviet fleets took only small quantities of scup and fluke incidental to other catches. Because these 2 fisheries are important to U. S. commercial and sport fishermen throughout Middle Atlantic area, it was considered important to protect fisheries.]

U. S. Permits Soviet Loading

• The U. S. will allow the Soviets to "conduct loading operations" in limited areas off Long Island and New Jersey. The Soviets will be able to transfer fish catches to processing vessels or transfer supplies from base ships to fishing vessels. Access to the loading area off Long Island will be permitted from Nov. 15 to May 15. From Sept. 1 through May 1, Soviet vessels will be permitted to load or unload in a 3-mile stretch off New Jersey. The loading area off southeastern Long Island was determined during the negotiations. The one off central New Jersey was to be defined and communicated to the USSR before Jan. 1, 1968. (See map p. 3 for N. J. area selected. The area was selected to interfere least with U. S. sport or commercial fishermen.)

[Loading and unloading in protected areas close to shore is important to the Soviets. They have encountered technical problems in high-seas transfers of catches and supplies. They also will be able to repair disabled vessels quickly.]

USSR Can Fish Off Long Island

• The U. S. gives the USSR the privilege of fishing in the 9-mile exclusive fishing zone off Long Island during Jan. 1 to April 1, 1968. This is the period when Soviet vessels will refrain from fishing in the area of silver hake concentration. The area is about 10 miles long and 6 miles wide. It extends landward towards Moriches Bay from the outer limits of the U. S. 9 mile fishery zone. It encompasses about 60 square miles. A similar privilege was extended to the USSR in a small area off the Alaska coast in the Feb. 13, 1967, Agreement.

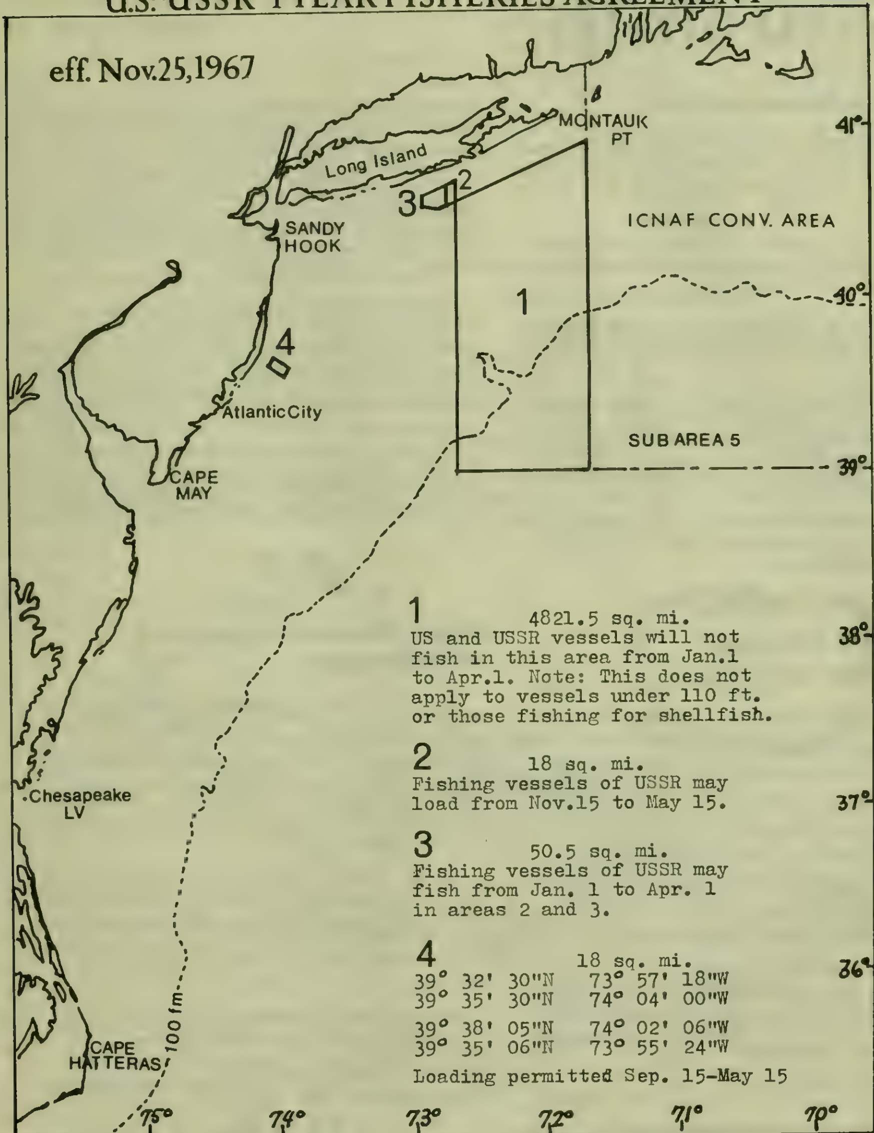
Both Nations To Expand Research

The Agreement seeks to ensure the maintenance of maximum sustainable yields from fisheries in the Mid-Atlantic Bight. The U. S. and the USSR will expand research "on species of fish of interest to both parties" and exchange scientific and research data, books, and articles. To coordinate fishery research, their scientists will meet periodically and exchange tours on research vessels.

[The investigations may provide data to evaluate Agreement's effectiveness and its potential for conservation.]

BCF and the Coast Guard jointly conduct extensive surveillance of foreign fishing vessels in U. S. waters. This service will make it possible for the U. S. Government to verify Soviet compliance with provisions of the "Atlantic Agreement."

# U.S.-USSR 1-YEAR FISHERIES AGREEMENT



# UNITED STATES

## Some Predictions for 1968

- Consumer demand for specialty items--shrimp, lobsters, scallops, clams, oysters, crabs--will continue to increase and push prices to new highs.

- The decline in U. S. fish catch during the past several years will level off. The catch may improve a little.

- Imports of fisheries products will continue to provide the largest part of U. S. supplies.

- There will be better-equipped vessels with more conveniences for crews (such as air conditioning and freezer chest) in the better-off segments of the fishing industry--shrimp and tuna.

- More attention will be paid to the quality of fish and shellfish. (BCF Branch of Fishery Statistics.)

## Future of U. S. Foreign Trade Policy Under Study

The Trade Information Committee in the Office of the Special Representative for Trade Negotiations (OSRTN) has ordered a public hearing to be held in Washington, D. C., March 25, 1968, on the future of U. S. foreign trade policy. President Johnson directed OSRTN to conduct a comprehensive study of U. S. foreign trade policy. When OSRTN completes the study now under way, it will recommend required legislative and other measures. The study is focusing on ways to expand trade among industrialized and developing countries.

OSRTN will seek the views and help of Congress, representatives of industry, agriculture, and labor, and of other interested persons. The views of foreign governments also will be considered.

Topics Under Study

The Trade Information Committee hearing is designed to provide a full exposition of public views on all aspects of U. S. foreign trade policy. The following topics are samples of those on which interested persons may submit views: (a) general or overall aspects of foreign trade, (b) trade of developed countries, (c) measures that may be nontariff barriers to trade, (d) future trade negotiations, (e) trade policies particularly affecting developing countries, (f) trade promotion, (g) administration of trade policy.

All requests to present oral testimony must be received by the Chariman, Trade Information Committee, Office of the Special Representative for Trade Negotiations [Room 729, 1800 G. Street NW. Washington, D. C. 20506] not later than Friday, March 8, 1968. Any party may submit a written brief to the Committee concerning subjects of the public hearing. Each party presenting oral testimony must submit a brief. All briefs must be received not later than Friday, March 15, 1968.

## Fishery Products Are About 2% of Total Imports

During January-September 1967, the U. S. imported items worth \$19.5 billion--\$700 million above the 1966 period. Fishery products accounted for about 2 percent of the 1967 total. Fresh, frozen, dried, salted, canned, and prepared seafood items were worth \$384.9 million--about 5 percent below January-September 1966.

Fresh, frozen, and cured fishery products (\$311.9 million) were down 7 percent in value; canned and prepared items (\$73 million), were up 6 percent. Fish meal imports amounted to \$54.7 million, up 18 percent over the 1966 period.

During January to September 1967, about 57 percent of the value of fishery imports entered duty free. A duty of \$11.5 million was collected on seafood items--an average 6.84 percent of their value.

## 3 Boats Return With Tuna From W. African Waters

Three commercial tuna seiners returned to the U. S. in December 1967 with over 1,500 tons of tuna, 60 percent yellowfin and 40 percent skipjack, which sold for nearly $500,000 dockside. U. S. seiners had fished in the Gulf of Guinea off Angola and Ivory Coast during October-November 1967 for the first time in about 5 years. Usually, these boats fish in the Pacific until November--but the owners had decided to follow BCF advice.

Since 1963, vessels from BCF and other nations have explored for commercial quantities of tunas in the tropical Atlantic. BCF's "Geronimo" made 6 surveys. The findings seemed to justify a trip by the 3 seiners--and the trip proved successful. ("Undaunted" departed Jan. 9, 1968, on the first of 2 cruises to West Africa.)

U. S. Tuna Fishing in Pacific

Many U. S. tuna boats long have fished in the eastern Pacific, especially for yellowfin. But a study showed that overfishing endangered yellowfin stocks. During the past few years, the Inter-American Tropical Tuna Commission has set a quota for the yellowfin catch. The Commission closed the fishing season for yellowfin tuna in the eastern Pacific on June 24, 1967, to limit the 1967 catch to the 84,500-ton quota set in 1966. The end of fishing 6 months early had confronted tuna seiners with a choice: find new areas or fish the cheaper skipjack tunas.

## 4-State Lake Michigan Enforcement Conference

A Federal-State enforcement conference to speed the clean-up of Lake Michigan is scheduled for January 31, 1968, in Chicago, Secretary of the Interior Stewart L. Udall has announced. Governor Otto Kerner of Illinois requested the conference.

Sec. Udall said it would be the first conference to attack all the pollution problems of Lake Michigan on a lake-wide basis. "No

resource problem in the country is more important than the saving of Lake Michigan," he emphasized.

In a telegram to Governor Kerner, Sec. Udall said: "Your request that I call an enforcement conference on the four Lake Michigan States to protect the water quality of Lake Michigan and its drainage basin reflects your long recognized leadership in the field of natural resources. I consider the saving of Lake Michigan so important that I am planning to attend and open the Federal four-State conference." Sec. Udall will serve as chairman.

He said formal notifications of the conference were mailed to the States involved: Illinois, Indiana, Michigan, and Wisconsin.

Problems Facing Conference

The participants will look at all pollution problems threatening Lake Michigan. These include "inadequately treated municipal and industrial wastes; dumping of dredged material into Lake; sewage and refuse discharged from commercial and pleasure boats; over-enrichment of the water by phosphates and other nutrients; oil pollution; thermal pollution; alewives and lampreys, and bacteriological pollution that forces closing of beaches along the lakefront."

An enforcement conference in 1965 dealt with only part of the Lake. A conference report indicated that discharge of untreated or inadequately treated sewage and industrial wastes into Lake Michigan, the Grand Calumet, Little Calumet, Calumet River, Wolf Lake, and their tributaries endangered the health and welfare of residents in Illinois and Indiana.

Since then, it became evident to those concerned that solution of the pollution problems of Lake Michigan and its tributaries requires a combined drive by the 4 bordering States, the cities, and the U. S. Government.

## U. S. and Romanian Experts Will Exchange Visits

The U. S. and Romania have agreed on a program of exchanges and visits for 1968. One part of the program will be a 3-month visit to the U. S. by 3 Romanian fisheries experts to observe and train with personnel of the Bureau of Commercial Fisheries (BCF).

During the training period, BCF scientists will be able to board a Romanian factory stern trawler working on Georges Bank to study fishing and fish-processing techniques.

The agreement also includes visits to Romania by experts from the Bureau of Sport Fisheries and Wildlife and the National Park Service of the U. S. Department of the Interior.

## Alewife Mortality in Lake Michigan Will Continue

Scientists of BCF's laboratory in Ann Arbor, Mich., recently completed an annual survey of alewives in Lake Michigan. They found the adult population very numerous despite millions of deaths in 1967. The severe problems caused by alewives in some Great Lakes can recur in spring and summer 1968.

Dr. Stanley A. Cain, Asst. Secretary of Interior for Fish and Wildlife and Parks, said very large hatches of alewives in 1964 and 1965 produced the current abundance. Dr. Cain heads a task force studying the problem. He said the hatch during summer 1967 also was very large. Alewives in the Great Lakes become very susceptible to mass death when 3 or 4 years old.

Task Force Report

A task force report said the phenomena of mass fish deaths have occurred since the late 1950's and that Lake Michigan's entire fish population is unstable. The mortality probably will continue in Lake Michigan as in Lakes Ontario and Huron so long as alewives predominate. The report recommended research to produce a better balance among species. Controlled introduction of desirable predators and successful commercial use of alewives may be answers to alewife abundance.

The report also noted: "The expense of cleaning up and hauling away dead fish imposed severe financial losses this summer

[1967]on cities and towns bordering Lake Michigan. The West Michigan Tourist Association estimated that resort owners lost more than $50 million, and some private owners were forced to abandon their vacation sites."

## Recover Many Tagged Columbia River Chinook Salmon

During the latter part of 1967, there was good recovery from commercial and sport catches of marked adult fall chinook salmon produced in Columbia River Fishery Development Program hatcheries. Through September 9, 4,678 marked fish were recovered from northern California to Alaska. Biologists and technicians from the State fisheries agencies and BCF cooperated in examining 20-25 percent of the fish landed at various Pacific coast ports. Canadian fisheries personnel helped the program on a voluntary basis.

Of the recoveries, 4,150 were from commercial catches; about 46.5 percent of them were from British Columbia. As the season progressed, a larger proportion of marked fish was recovered in the Columbia River catches and at the hatcheries. A complete tabulation should be available shortly after Jan. 1, 1968.

## Pacific Shellfish Sanitation Workshops Well Attended

Workshops organized to stress the importance of good sanitation practices in the shellfish industry were sponsored recently in Eureka, Calif., and Newport, Oregon, by the Food and Drug Administration in cooperation with the states. More than 100 management and plant workers from Pacific coast shrimp and crab plants attended each meeting.

Congress and regulatory agencies have shown interest recently in overall processing sanitation. BCF technologists participated in the workshops.

## Task Force Studies Overfertilization of Lakes

The government-industry group investigating ways to control overfertilization of lakes (eutrophication) will develop a procedure to determine how much various chemicals and waters contribute to the growth of algae.

Eutrophication is the natural aging process of lakes. It causes trouble when the addition of nutrients, mainly phosphates, speeds the process. Phosphates are a common element in municipal sewage, human waste, agricultural fertilizers, detergents, and industrial discharges. Nitrates too contribute to the problem.

### Man Adds Nutrients

The activities of people add more nutrients to the lakes and the aquatic plants increase and die. Organic deposits rise from the lake bottom. "The lake becomes shallower, smaller, warmer, and organic decay depletes the supply of oxygen." Over the centuries, the lake becomes a marsh and, eventually, disappears. Lake Erie is an example of seriously accelerated eutrophication in the U. S. There, algal growths occur with increasing frequency. Obnoxious slimes and odors prevail. Parts of the lake bottom have no oxygen at all. The value of Lake Erie for recreational purposes is threatened seriously.

### Seeking Answers

The task force considers the development of a procedure to determine algal growth potential (AGP) of various chemicals and waters an important first step in fighting eutrophication. Algal blooms on lakes can be a sign of accelerated eutrophication, but there is little agreement among scientists on a best or "standard" technique to measure a lake's capacity to grow algae--and the tendency of chemicals to stimulate algal growth.

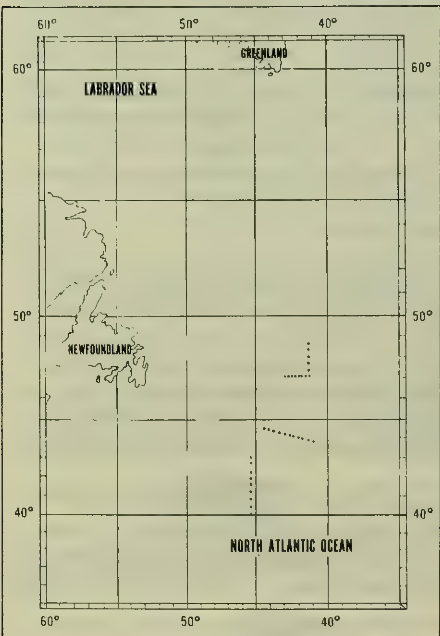
In its search, the task force is consulting scientists at the Federal Water Pollution Control Administration laboratories, technical personnel from industry, university experts, independent research institutions, and private specialists.

# OCEANOGRAPHY

## Grand Banks International Ice Patrol

On March 28, 1968, the U. S. Coast Guard vessel "Evergreen" will begin the first of 4 consecutive 30-day oceanographic cruises to the Grand Banks. The main purpose of these cruises will be to collect data to support the iceberg drift prediction requirements of the International Ice Patrol. The secondary purpose will be a study of the structure and migration of the semipermanent eddy at the Tail-of-the-Banks, delineate the cold core of the Labrador Current, and continue the investigation of iceberg drift and deterioration in this region.

Temperature and salinity data will be collected by Nansen casts and/or automatic Salinity-Temperature-Depth system from the surface to 1,500 meters at each station along 3 standard monitoring sections. (See chartlet.) Temperature data also will be obtained by




Expendable Bathythermographs (XBTs). All data collected will be processed at sea by digital computer.

A recording temperature sensor will be placed in the cold core of the Labrador Current for about two months to study time changes in the current. The sensor will be anchored in 3,000 feet of water on a tautline moor.

"CGC Evergreen is equipped to make precision depth measurements, dissolved oxygen determinations, collect bottom sediment samples, and collect and preserve water samples for subsequent special chemical constituent determinations."

## Buoy Beaming Data to Ships

The U. S. Naval Oceanographic Office now has an undersea radioisotope generator to power an oceanographic buoy platform that will beam scientific data to ships, planes, and satellites. The buoy platform contains an Interrogation Recording Location System. It is an experiment to determine the feasibility of finding and obtaining scientific surface data from ocean platforms by unmanned satellites. It is one of the experiments being conducted in connection with the Nimbus-B weather satellite program.

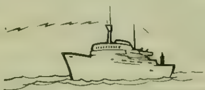
The radioisotope generator is a 25-watt undersea model produced commercially. Attached to a taut wire moored buoy 250 feet beneath the Atlantic Ocean's surface, the generator will supply electrical power to the Interrogation-Recording-Location-System (IRLS) surface spar float.

### Moored Off Puerto Rico

Sensors will be put on the buoy platform, moored off the coast of Puerto Rico, to make environmental measurements--sea states, ocean currents, wind velocities, etc. The IRLS transmitter will telemeter the data from a specially designed antenna mounted atop the spar float. As the Nimbus-B satellite passes overhead twice a day, it will interrogate the platform and store the data for

later playback as it crosses a central ground command station at Fairbanks, Alaska.

If the IRLS experiments prove successful, similar unmanned scientific data collection stations using radioisotope power could be placed at remote spots throughout the world. Their data, plus that from orbiting satellites, will provide a modern technique for data collection and telemetering for oceanography. They also will permit precise global location of data stations without sophisticated navigational aids.



## Coast Guard and BCF Cooperate to Aid ICNAF Research

The U. S. Coast Guard and BCF are conducting cooperative oceanographic cruises to support the research program planned by ICNAF (International Commission for the Northwest Atlantic Fisheries). The 2 U. S. agencies are studying the offshore resources fished by the United States and other member nations of ICNAF. The aim of the international program is to understand natural fluctuations in abundance of commercial fishes and to assess the effects of fishing. BCF's Biological Laboratory in Woods Hole, Mass., is coordinating U. S. efforts.

From Jan. 15-Jan. 26, 1968, the Coast Guard's Boston-based "Evergreen" conducted an environmental survey of Continental Shelf waters between Nova Scotia and Long Island. The hydrographic data collected will supplement earlier data collected in the same area by BCF's "Albatross IV." During the Evergreen's cruise, the Fisheries Research Board of Canada's "Cameron" conducted a similar survey in the Bay of Fundy and Scotian Shelf area.

What Evergreen Did

At each station occupied, a Salinity-Temperature-Depth recording instrument (STD) was lowered, plus a Nansen bottle cast to obtain water samples to determine dissolved oxygen and chlorophyll. Also, drift bottles were released--and seabed drifters at stations shoaler than 275 meters. Water temperature profiles were obtained at about 43 locations along the trackline by Expendable Bathythermograph System (XBT).

The Evergreen's regular crew was increased by a Coast Guard Oceanographic Unit Field Party of Oceanographers and Oceanographic Technicians.

Studied Cape Cod to Cape Hatteras

From Dec. 11-22, 1967, the Evergreen conducted an intensive hydrographic survey of coastal waters between Cape Cod., Mass., and Cape Hatteras, North Carolina. Thirty-four stations were occupied. The hydrographic data collected will be used to evaluate groundfish surveys conducted in the same area by BCF's Albatross IV and the Soviet's "Albatros."

Results of these cruises will appear in joint BCF-CG post-cruise documents. They will become part of the report on the cooperative U. S.-USSR Middle Atlantic Study.

## Oceanographic Projects Continue at 4 N. Atlantic Stations

Oceanographic projects are continuing at the 4 North Atlantic Stations--"Bravo" "Charlie," "Delta," and "Echo"--manned by U. S. Coast Guard Cutters. The stations are occupied on a 3-week patrol basis.

The oceanographic program consists of time-series observations of temperature and salinity. Nansen casts are made daily to 1500 meters depth. Once during the 3-week patrol, casts are made to near bottom, if weather and other operations permit. Observations are made at 14 or 15 depths. The temperature data are transmitted by radio teletype to the U. S. Coast Guard Oceanographic Unit for real-time processing, quality control, and distributed to users. Salinities are determined at sea by inductive salinometers. Occasionally, other oceanographic observations are made on request--biological sampling, collection of samples for chemical analysis, bathymetry, wave-height measurements, etc.

## Foreign Fishing off U. S. Coasts in November 1967

IN NORTHWEST ATLANTIC

During November 1967, 46 individual foreign fishing vessels--from Poland, East and West Germany, and the Soviet Union--fished off New England. Weekly sightings noted fleets of 30 to 35 vessels; not all stayed the entire month.

Early in November 1966, only about 15 Soviet vessels fished on Georges Bank, then dwindled to an occasional few by month's end; there were no Polish or German vessels.

Polish: Poland continues to lead in number of foreign vessels off New England. Throughout November, 30 individual vessels were identified as 4 freezer stern trawlers, 23 large side trawlers, 1 factory base ship, and 2 supply vessels.

Early in month, 28 Polish vessels were scattered along eastern slopes of Georges Bank. Moderate catches observed on several vessels appeared to be herring and some haddock.

Fig. 1 - Polish freezer stern trawler "Albakora" (SWI-183), fishing for herring on Georges Bank, September-October 1967.

By mid-month, the fleet was reduced to about 20 along southeast part of Georges Bank. The limited catches of fish on deck appeared to be scrod haddock. (U. S. vessels located slightly northwest of the Polish fleet on the winter fishing grounds of Georges Bank reported haddock fishing generally poor.)

Late in month, most Polish vessels shifted to southern New England fisheries south of Martha's Vineyard and Nantucket Island. Again, large catches of herring were observed on deck and in nets. This was the first instance of any significant activity by Polish vessels in those two areas. In the same areas in recent years, large Soviet fleets had developed an extensive red hake and whiting fishery during winter.

Several times during month, Polish trawlers were anchored or nested alongside large factory base ship and other supply vessels stationed about 22 miles southeast of Gloucester, Mass. This general area has been used during past two months for transferring fish and replenishing supplies.

Soviet: Since late October, only 5 or 6 factory stern trawlers were scattered between Georges Bank and southern New England searching for concentrations of fish. The occasional catches observed on deck appeared to be whiting. The same was observed during November 1966.

East German: One freezer stern trawler was observed fishing among vessels of other nations south of Martha's Vineyard and Nantucket Island during second part of November. Large catches of herring were observed.

Fig. 2 - East German freezer stern trawler (ROS. 705). Name and vessel class unknown. Sighted Georges Bank October 1967. Large catch of fish believed herring.
(Photos: Resource Management, BCF, Gloucester, Mass.)

West German: Early in month, 5 to 7 freezer stern trawlers fished east of Cape Cod (Great South Channel). By month's end, fleet increased to 10 and shifted operations south of Martha's Vineyard and Nantucket Island. Heavy-to-moderate catches of herring were observed. Like the Poles, this is first time West Germans fished off southern New England.

On Nov. 24, the freezer stern trawler "Eric Ollenhauer" entered Boston Harbor to pick up supplies at Everett, Mass. A BCF resource management agent visited vessel. He reports that it had been midwater trawling about 50 feet off bottom for herring on Georges Bank. Catches were excellent, averaging 20 to 30 tons per tow; some tows yielded up to 50 tons. The captain said 15 West German vessels were fishing Georges Bank during the latter part of November. He thought more might be coming because fishing was excellent. The catch is unloaded at St. Pierre et Miquelon Islands because there are no fish transports or motherships

in the area. The 40-man stern trawler is equipped with the latest electronic devices, including a "netsonde machine" (a recorder showing depth of trawl and amount of fish entering the net).

IN THE GULF OF MEXICO

No foreign vessels were sighted off U. S. during October.

OFF CALIFORNIA

Soviet: During November, number of vessels fluctuated greatly. No sightings were reported during first half but, by mid-month, 7 vessels were fishing north of San Francisco (two 20 miles west of Eel River and the rest 28 miles west of Orick, off Humboldt County). In third week, no vessels were sighted; toward month's end 7 vessels again were sighted off Bodega Head and Crescent City. Although they were in area of good shrimp beds, they were catching fish.

It can be expected that with the end of hake fishing off Pacific Northwest and beginning of stormy season in more northern latitudes, more Soviet vessels will tend to concentrate off California. A similar movement occurred in 1966 when, in the first week of December, the 60-vessel hake fleet off Oregon and Washington left; 20 vessels moved south and began fishing off San Francisco south of Farallon Islands.

No information is available on species caught off California.

OFF PACIFIC NORTHWEST

Soviet: During November, 27 to 59 vessels were sighted off Washington and Oregon. The number of fishing, support, and research

Table 1 - Soviet Fishery Vessels Sighted Off Pacific Northwest in November 1967

| Week Ending | Area | Type of Vessel: Medium Side Trawlers | Stern Factory Trawlers | Support Vessels | Research Vessels | Total |
|---|---|---|---|---|---|---|
| Nov. 2 | Wash. | 21 | 3 | 7 | | 31 |
| | Oregon | 1 | 17 | 3 | 1 | 22 |
| Total | | 22 | 20 | 10 | 1 | 53 |
| Nov. 9 | Wash. | | not available (bad weather) | | | |
| | Oregon | | not available (bad weather) | | | |
| Nov. 16 | Wash. | 23 | 6 | 9 | 1 | 39 |
| | Oregon | 1 | 15 | 2 | 2 | 20 |
| Total | | 24 | 21 | 11 | 3 | 59 |
| Nov. 23 | Wash. | 1 | 2 | | 1 | 4 |
| | Oregon | 1 | 18 | 2 | 2 | 23 |
| Total | | 2 | 20 | 2 | 3 | 27 |
| Nov. 30 | Wash. | | | 1 | | 1 |
| | Oregon | 13 | 12 | 8 | 2 | 35 |
| Total | | 13 | 12 | 9 | 2 | 36 |

Table 2 - Soviet Fishery Vessels Sighted Off Pacific Northwest in November 1966

| Week Ending | Area | Type of Vessel: Medium Side Trawlers | Stern Factory S Trawlers | Support Vessels | Research Vessels | Total |
|---|---|---|---|---|---|---|
| Nov. 3 | Wash. | 31 | | 17 | 2 | 50 |
| | Oregon | | 12 | | 1 | 13 |
| Total | | 31 | 12 | 17 | 3 | 63 |
| Nov. 10 | Wash. | 42 | 3 | 19 | 3 | 67 |
| | Oregon | 1 | 7 | | | 8 |
| Total | | 43 | 10 | 19 | 3 | 75 |
| Nov. 17 | Wash. | 40 | 3 | 15 | 3 | 61 |
| | Oregon | | 1 | | | 1 |
| Total | | 40 | 4 | 15 | 3 | 62 |
| Nov. 24 | Wash. | 38 | 4 | 16 | 3 | 61 |
| | Oregon | | 5 | | | 5 |
| Total | | 38 | 9 | 16 | 3 | 66 |
| Dec. 1 | Wash. | 37 | 1 | 14 | 3 | 55 |
| | Oregon | | 4 | | | 4 |
| Total | | 37 | 5 | 14 | 3 | 59 |

vessels increased during first 2 weeks to 59. In remaining two weeks, only 27-36 vessels operated off Pacific Northwest. (In November 1966, 59 to 75 vessels were sighted in same coastal area.)

Of the vessels sighted in November 1967, most were large stern factory trawlers, with a smaller number of medium side trawlers. There were the usual number of support vessels, and also 1 to 3 research vessels. This is significantly different from November 1966, when there were almost half as many large stern trawlers and more medium side trawlers. A large stern trawler (2,600-3,200 gross tons) can catch up to 6-7 times as much fish as a medium side trawler (500-700 gross tons) during same time and under similar conditions.

In November 1966, there were more processing and other support vessels; in 1967, only 9 to 11 were sighted during most of month. This means fewer support vessels are needed because larger self-supporting stern trawlers can also process fish.

During first-half November, the Soviets fished off Washington and Oregon; in third week, they switched almost entirely to Oregon; some of those vessels were heading for California.

OFF ALASKA

Soviet: Fishing continued at low level; 20 or fewer vessels fished for Pacific ocean perch.

Within Gulf of Alaska, about mid-November, 4 more factory trawlers joined 6 sisterships. Major emphasis was on lower Albatross Bank near Chirikof Island where, in mid-month, 2 large stern factory trawlers (BMRT's) were joined by 5 others and a refrigerator vessel. On outer Portlock Bank east of Kodiak, one stern trawler fished throughout month. West of Yakutat Bay, 3 large stern trawlers fished during first-half November, but only one about mid-month.

There was a corresponding reduction in fishing along Aleutians during first two weeks of November, from about 12 to about 6 factory trawlers. Most apparently were fishing in Seguam-Amukta Passes region.

Japanese: Withdrawal of factory trawlers in November reduced number of vessels off Alaska to less than 10 by month's end--lowest level this year.

By month's end, 5 factory trawlers had been withdrawn from Gulf of Alaska, leaving 2 such vessels operating full time. Remaining factory trawlers operated principally west of Yakutat Bay. A second group of 4 factory trawlers appeared intermittently along southern boundary of Dixon Entrance. Apparently, it is fishing along west coast of Queen Charlotte Islands.

It is believed the typically inclement, late-fall weather also curtailed Japanese perch fishing in southeastern Bering Sea and along Aleutians. Only 1 factory trawler was working just north of Unimak Pass at month's end.

During November, at least 6 Japanese longline vessels fished for sablefish in the Alaska area: 4 of these in central Gulf near Middleton Island, 1 in western Gulf off Chirikof Island, and the sixth north of Fox Islands in eastern Aleutians.

# STATES

## Alaska

SPOT SHRIMP FISHERY DEVELOPS

In 1967, landings of spot shrimp (Pandalus platyceros) in the developing fishery in southeastern Alaska were 32,000 pounds. At least 20 vessels were active at some time during the year; 4 of these fished consistently since the end of the salmon season.

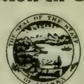
Explorations by BCF had found commercial concentrations of the large shrimp. BCF technologists worked on handling and processing methods. These 2 events led to the fishery's beginning.

* * *

OIL POLLUTION IS POTENTIAL DANGER TO FISH AND WILDLIFE

During November 1967, a combination of storms and tides pushed ducks into contact with an oil spill in Cook Inlet, Alaska. An estimated 1,800 to 2,000 ducks were killed; the Pacific eider was hardest hit.

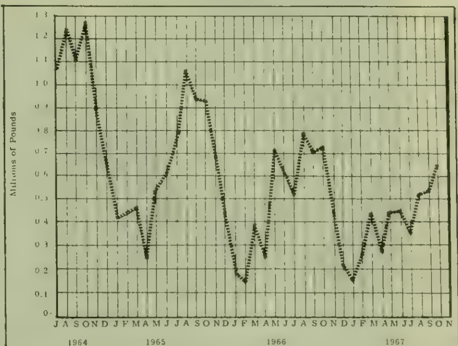
The incident substantiates warnings by BCF, Bureau of Sport Fisheries and Wildlife, and Federal Water Pollution Control Administration against the potential danger of extensive oil pollution in Cook Inlet to fish and wildlife.



## South Carolina

CRAB INDUSTRY WARNED OF ECONOMIC RUIN

In a report to the South Carolina crab industry on Dec. 1, 1967, C. Robert Lunz of Bears Bluff Laboratories on Wadmalaw Island warned the industry to protect itself from "economic ruin, an inevitable conclusion," if the production decline of recent years continues. In February 1966, he noted, Bears Bluff released a report entitled: "An Interim Report to the Crab Industry on Studies Being Made on Blue Crabs in South Carolina". The chart showed the relative abundance of blue crabs throughout the state from 1955 to 1965 and was based on data from experimental trawling. The decline of male crabs, which began in 1959, and of female crabs in 1963, caused some concern, but it was hoped these fluctuations were part of a "normal" cycle.



South Carolina crab harvest.

Since that time, however, there have been two large and widespread kills of crabs. After reviewing the commercial crab harvest month by month since July 1964, Lunz is concerned about the future of the crab industry.

A steady decline in crab production for all South Carolina producers is shown in the accompanying graph. There has been an almost 25 percent decline in harvest each year from 1964 to November 1967.

Crab kills from North Carolina down into Georgia have been studied by Bears Bluff, aided by U. S., state, and county biologists from all along the coast. The industry has cooperated. "Certainly the as yet unknown cause of these crab kills is a very important factor in the decline in the blue crab populations," writes Lunz, "but there is reason to believe that other factors are involved."

He states: "It would behoove everyone in the crab industry to exert every effort to keep intact the marshes so essential for the growth and development of crabs; to guard against pollution; and take an active part in seeing that pesticides are used with as much care as possible. Changes in marshes, increased pollution and unwise use of pesticides coupled with adverse meteorological conditions could

well be among the responsible forces causing the crab decline.

"There is some evidence to indicate that overfishing and intensive fishing pressure is not ordinarily a factor in the decline of crab populations. This evidence is not altogether conclusive. These past few years have not been 'ordinary' years in South Carolina."

Crab Scarcity Predicted

Lunz notes that a scarcity of crabs has been predicted for the Chesapeake Bay area this winter and that the resulting higher prices will be a temptation to increase fishing. Some biologists suggest that heavy fishing pressure on female crabs during winter when eggs are developing is too much for a sustained yield. If is so, Lunz writes, a moratorium on the winter fishery where crabs congregate in large numbers during cold weather should show beneficial results in the two following years.

Lunz concludes: "In the long run it is the industry itself which will have to decide whether or not to adopt a moratorium, but this letter sounds a warning to the industry and urges that all join in whatever efforts may be necessary to find answers to why crabs are declining."

## Florida

ARMY ENGINEERS AID MILLIONS
OF SPAWNING MULLET
THROUGH OKEECHOBEE WATERWAY

Hundreds of thousands of black or striped mullet making their annual migration from Lake Okeechobee to the Atlantic and the Gulf to spawn are being helped through the locks of the Okeechobee waterway by the U. S. Army Corps of Engineers. This year's mullet run is extremely large. It started at the beginning of December 1967. More than 500,000 mullet were "locked through" the St. Lucie facility, near Stuart, Fla., on Sunday, December 3. Millions of mullet will be locked through during the following 2 to 3 months. Army Engineer locktenders work around the clock during mullet runs to get them through the boat-lift facility.

The roe mullet ranged up to 6 pounds and probably averaged about 3 pounds.

1955 A Milestone

The phenomenon of the mullet run was not fully realized until winter 1955. Before, there never had been any need for special assistance at the navigation lock during the spawning migration. But in 1955 an unprecedented mullet population swam furiously down the St. Lucie Canal, gasping for air and competing with boats to get through the lock. The regular lockages were insufficient and many mullet died.

Since 1955, Army Engineers have worked with the U. S. Fish and Wildlife Service, state biologists, and the State Board of Conservation to cooperate with the mullet run. The engineers make special lockages when necessary to get the mullet to salt water, where they deposit their eggs.

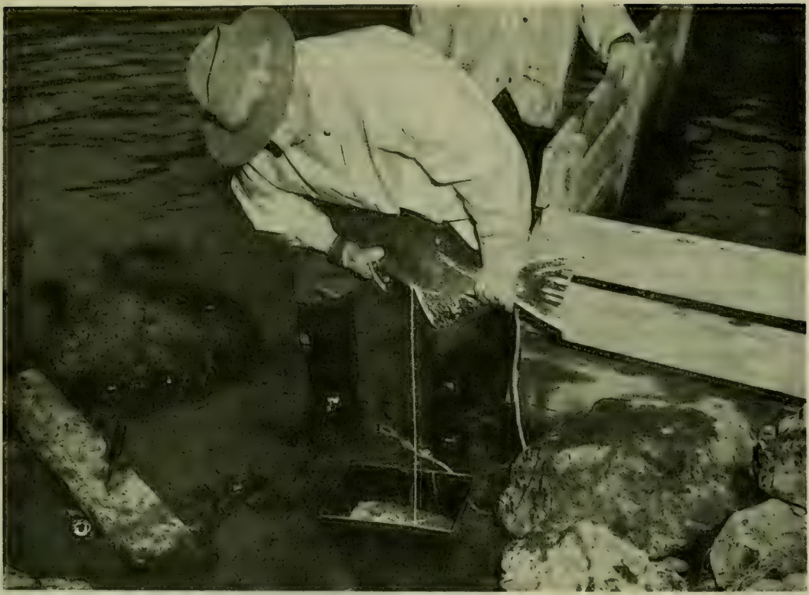
During their frantic spawning trip, the mullet rarely take a hook. But when they return to Lake Okeechobee's fresh water from the estuaries in early spring, they usually are very hungry and will take many types of bait.

Meanwhile, the engineers at St. Lucie Lock watch and wait to respond to the mullet runs. They know that wind and temperature apparently have a great effect on size and length of the run. When the wind shifts from the northwest to the east, the heavy spawning run slows to a halt.

## Oregon

SALEM CITY PARK TO REAR SALMON

A 12-acre pond in Salem's Cascade Gateway Park has been selected for a pilot project that may lead to a series of ponds producing over 10,000,000 fall chinook salmon a year for release into the Willamette River, reports the Oregon Fish Commission. The Regional Parks Agency and the commission are cooperating to have 2,000,000 tiny fall chinook from one of the commission's Columbia River hatcheries released into the pond in March 1968--for eventual release into near-



Male salmon being milked of sperm. (USIA in National Archives)

by Mill Creek, a Willamette River tributary. The young salmon will be planted in the pond, fed, and liberated before public use of the park becomes heavy again in June.

If the program is successful and money available, Fish Commission biologists envision a series of ponds throughout the Willamette basin producing more than 10,000,000 small fall chinook ready to begin their downstream migration. Future pond sites have been located tentatively on the Molalla, North Santiam, South Santiam, and the main stem Willamette near Eugene.

Pond-Rearing Research Since 1961

The pilot program at the Salem park follows experimental work at the Commission's Wahkeena Pond in the Columbia River gorge. There, biologists have carried out natural pond-rearing research since 1961 under contract to the U. S. Bureau of Commercial Fisheries.

Sometime during the latter part of March 1968, 2,000,000 small fall chinook will be placed in the pond, fed the Oregon Pellet, and be released eventually into Mill Creek--to travel through the heart of Salem to the Willamette, the Columbia River, and on to the sea.

* * *

CONFERENCE ON
MARINE AQUICULTURE

A Conference on Marine Aquiculture will be held at the Oregon State University Marine Science Center, Newport, Oregon, May 23 and 24, 1968. Invited participants will present formal papers on 8 topics: fish culture, shellfish culture, behavior, genetics, nutrition, disease, economics, and engineering.

Address inquiries to: William J. McNeil, Oregon State University, Marine Science Center, Marine Science Drive, Newport, Oregon 97365.

# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## "Delaware" Finds Commercial Amounts of Northern Shrimp

Commercially usable concentrations of northern shrimp (Pandalus borealis) were found in the western Gulf of Maine during the 6-week shrimp survey of the Delaware (67-9). The vessel returned to Gloucester, Mass., on Dec. 8, 1967, after a systematic survey of shrimp resources in an area of about 3,600 square miles. The area lies between Cape Cod, Mass., and Portland, Maine, from 10 to 80 miles offshore.

Trawl tows were made in depths of 28 to 150 fathoms. Catches of shrimp up to 1,000 pounds per 1-hour tow were made. Count per pound (heads on) for all shrimp taken was well within the range desired for commercial use--30 to 60 per pound. This cruise was the first of several planned to complete a survey of shrimp resources in the Gulf of Maine.

Cruise Purposes

The purposes of the cruise were: (1) to locate commercially potential concentrations of northern shrimp that could be harvested during this period prior to the normal shrimping season, (2) to determine the boundary limits of these concentrations, (3) to ascertain the production potential of shrimp populations located, and (4) to collect data on the behavior and accessibility to fishing gear of northern shrimp populations.

Procedure

210 tows were made using (1) a 30-foot (headrope length) chain-rigged try-net, (2) a roller-rigged 70-foot Maine shrimp net, or (3) a chain-rigged 70-foot Maine shrimp net. When the cruise began, comparison tows were made to determine catch ratios between the try-net and the two 70-foot nets. One comparison tow was made between the roller net and the chain-rigged net; the chain net caught about 60 percent more shrimp than the roller-rigged net.

The tows were located generally at the intersection of grid lines spaced about 5 miles apart. Preliminary exploratory tows were made with the try-net. If the catch was large enough to indicate good concentrations of shrimp, 20 pounds or more, one of the larger nets was fished. If the try-net catch was small, the vessel proceeded to the next designated station without making a tow with a large net. The roller-rigged net was used where the bottom was too rough for the chain-rigged net.

The total weight of shrimp in each tow was determined by measuring the catch in bushel baskets and taking the average weight of the baskets of shrimp. Samples were taken to determine the count per pound and shrimp lengths. During the first two parts of the cruise, work proceeded around the clock; during the last part, the work period was reduced to coincide more nearly with daylight hours, when catches were somewhat better.

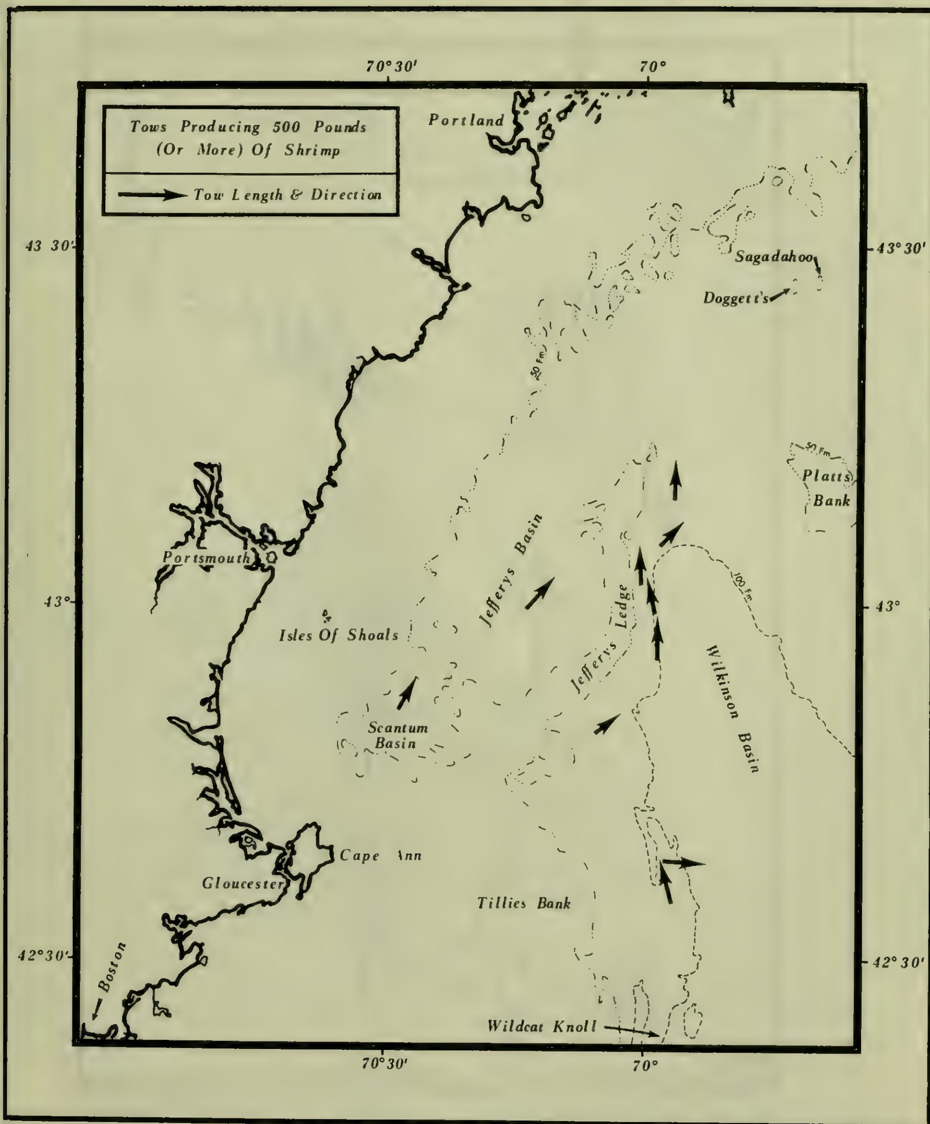
Results

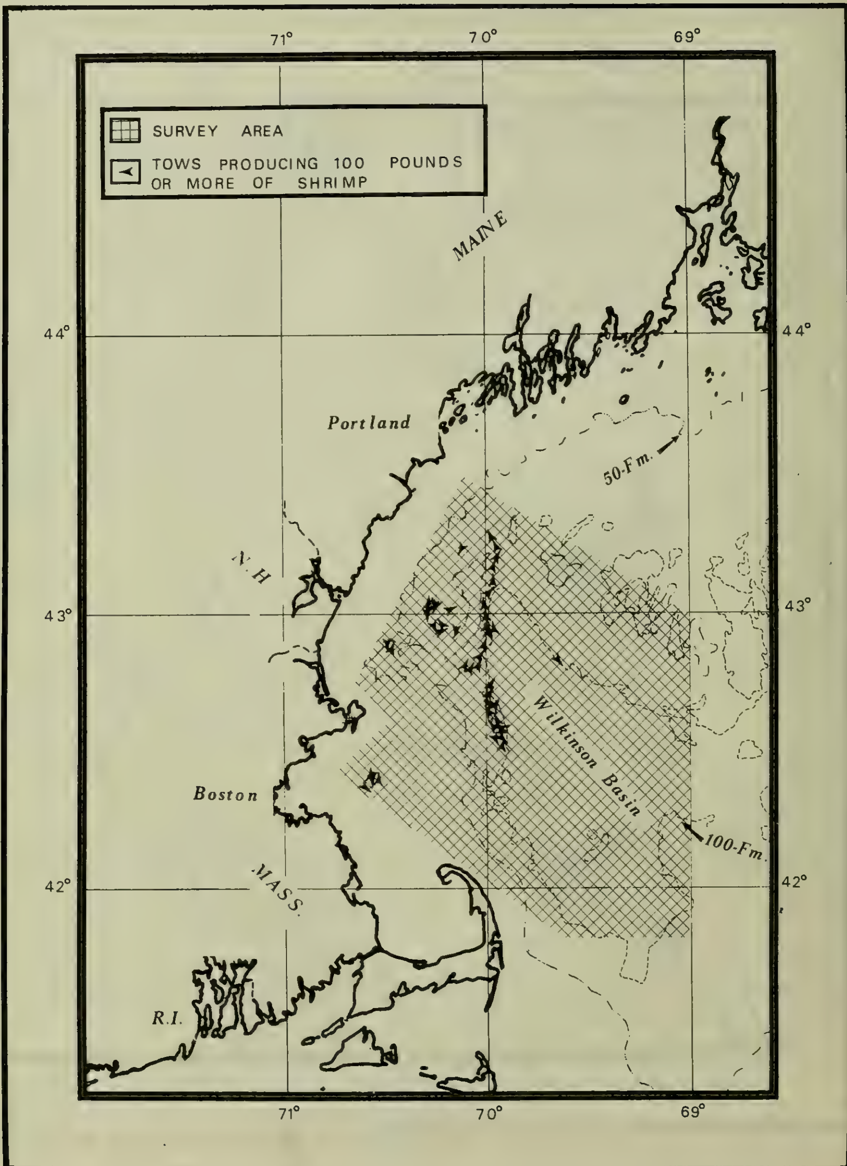
Of the 210 tows made, 137 were made with the try-net, 67 with the roller net, and 6 with the chain net. Catches in the try-net varied from zero to 55 pounds. Catches in the roller net varied from 4 to 1,000 pounds of shrimp per hour tow, and the chain net took from 23 to 400 pounds of shrimp per hour. Generally, the larger catches were taken in 40- to 110-fathom depths. Offshore of the 100-fathom contour bordering the western edge of Wilkinson Basin, most tows produced small catches of shrimp from either the small try-net or the larger commercial size nets.

Except for a small area just south of its western tip, tows made in the Middle Bank area produced generally poor results. The best catches here were about 400 pounds of shrimp per hour. All tows caught a high percentage of trash and other fish species. Separation of shrimp from other material in these catches was difficult and time consuming.

Good concentrations of shrimp were located west of Jeffreys Ledge, where up to 700 pounds per tow were taken. However, here, as around the Middle Bank, the amount of associated species mixed in with the catch makes this area somewhat less than desirable--when compared with the area lying along the eastern side of the ledge.

Starting just north of Wildcat Knoll, and extending northward to a point about 30 miles


70° 30'
70°
Tows Producing 500 Pounds (Or More) Of Shrimp
Tow Length & Direction
Portland
43 30'
43° 30'
Sagadahoo
Doggett's
50 Fm
Platts Bank
Jefferys Basin
Portsmouth
100 Fm
43°
Isles Of Shoals
Jefferys Ledge
Wilkinson Basin
Scantum Basin
Cape Ann
Gloucester
Tillies Bank
42° 30'
Boston
Wildcat Knoll
70° 30'
70°


71°
70°
69°
SURVEY AREA
TOWS PRODUCING 100 POUNDS
OR MORE OF SHRIMP
MAINE
44°
Portland
50-Fm.
N.H
43°
Wilkinson Basin
Boston
100-Fm.
MASS.
42°
R.I.

south of Casco Bay, is the area that produced the best and most consistent catches of shrimp. The maximum catch was 1,000 pounds per 1-hour tow with roller-rigged net; most other catches exceeded 200 pounds. Many catches were nearly pure shrimp mixed with only a few other species. At this time, commercial shrimp fishing should be profitable in this area. The catch rate is good, the shrimp are large, and nearly pure shrimp can be taken.

The best catches were taken between 80 and 100 fathoms. When taken at greater depths, they generally were not in great abundance. In less than 40 fathoms, there were few shrimp or, in most cases, none.

Species

Regardless of area fished, all positive tows produced catches with varying species composition. No tow produced an entirely clean catch of shrimp. Starfish were prevalent in many catches in the Middle Bank area, while catches elsewhere were predominantly various finfish species. In a few tows, the catch of redfish exceeded 1,000 pounds. Most of these redfish were large size and free from "buttons,"--parasitic copepods *Sphyrion lumpi*. The most common finfish species taken were: cod (*Gadus callarias*), dabs (*Hippoglossoides platessoides*), gray sole (*Glyptocephalus cynoglossus*), haddock (*Melanogrammus aeglefinus*), hake (*Urophycis* sp.), redfish (*Sebastes marinus*), pollock (*Pollachius virens*), cusk (*Brosme brosme*), whiting (*Merluccius billinearis*). Weight per tow for these species varied from several individuals to 5,000 pounds of redfish.

Size of Shrimp

A small random sample of shrimp was taken from each catch and weighed to determine the weight/count relationship. Most smaller catches produced shrimp of 30 to 35 per pound. The larger catches, which occasionally included many younger shrimp, averaged about 40 shrimp per pound. Thus, all shrimp taken fell well within the size range desired by the processing industry. In the smaller catches, almost all individual shrimp were egg-bearing females, while in the larger catches younger and smaller shrimp generally were mixed with ripe females.

Length measurements were taken from selected samples at most stations. Lengths varied between 20 to 34 millimeters for carapace length from the back of the eye socket to the end of the carapace.

Shrimp Shaker

A small, experimental, mechanical shrimp shaker was used to help sort shrimp from other species and trash. It did not separate shrimp from trash with desired speed. However, it demonstrated successfully the basic design's feasibility and the desirability of further modifying the shaker to make it practical. By using a successful and practical shrimp separator as a basic component, a complete deck-handling system might be developed. This would incorporate shrimp-grading screens to increase possibly further the ex-vessel price for shrimp. A new shrimp separator has been designed, which will be tried during future cruises.

Note: For additional information concerning this cruise and program work associated with it, contact: Keith A. Smith, Base Director, Ernest D. McRae, Jr., Assistant Base Director, or Phillip S. Parker, Fishery Biologist, Exploratory Fishing & Gear Research Base, State Fish Pier, Gloucester, Mass., 01930. Tel. 617-283-6554.

## "Cobb" Completes Gear Evaluation Cruise

The John N. Cobb completed a 3-week cruise in waters off Washington State during which roller gear configurations for use on bottom trawls, along with a warp tension system, were evaluated. (Cruise 91, ended Nov. 17, 1967.) Scuba-equipped divers observed the performance of a contemporary and experimental roller system. The contemporary system performed well, but the experimental system needs further design work. The warp tension system monitored wire strain satisfactorily. It was considered a valuable addition to the Cobb's fishing system.

One of the cruise's most valuable contributions was the presentation to commercial fishermen, through a series of drawings, of the net's actual configuration when being fished with various types of roller gear and dropper chain arrangements. These drawings were based on observations and measurements made by Scuba divers while the net was being fished from the Cobb. The drawings showed the configuration of the net, and distance of footrope and headrope above the seabed, along various sections of the net.

Objectives

The primary objective of Cruise 91 was to test the BCF Lampara trawl as a bottom net and evaluate its commercial potential. Other objectives were to evaluate an acoustic gear spread measuring system; the effect of door tilt on spreading ability; the standard BCF Universal trawl; Mark II Universal trawl; and handling characteristics and buoyancy of naturally buoyant and externally buoyed gangion twine for use in longline fishing.

BCF Lampara Trawl Evaluation

Methods: The BCF Lampara trawl was fished in coastal waters from Cape Flattery to Destruction Island, Wash., in the Strait of Juan de Fuca near Port Angeles, and in Holmes Harbor, Puget Sound. Comparative tows were made from the Cobb with a 400-mesh Eastern otter trawl. Catches with the Lampara trawl were also compared to those of a commercial trawler working the same area. The Lampara trawl was towed at similar ground speeds to the 400-mesh Eastern net; however, the 400-mesh Eastern net was towed at 240 r.p.m., while the Lampara was towed at 310 r.p.m.

in scope ratio by raising towing point about 3 feet above sea bed.

The 400-mesh Eastern otter trawl used for comparative tows had a 94-foot-long footrope and was made of nylon webbing with $4\frac{1}{2}$-inch mesh wings and $3\frac{1}{2}$-inch mesh intermediate and cod end; 100 feet of $\frac{1}{4}$-inch chain was hung to the footrope and eleven 8-inch aluminum trawl floats were attached to the headrope. The first 20 fathoms of the 25-fathom, $\frac{1}{2}$-inch steel bridles were single; the last 5 fathoms were double.

The trawl doors used to spread both nets were 6- by 10-foot steel V-doors made of reinforced $\frac{5}{32}$-inch plate and weighted 860 pounds each.

Results: Eleven 1-hour tows were made offshore with the Lampara trawl between Destruction Island and Cape Flattery. Two of these tows could be compared with tows made by a commercial vessel in the area; 3 others could be compared with 400-mesh Eastern tows made by the Cobb offshore and in Strait of Juan de Fuca.

Pertinent catch data:

| | | Comparison of Catches of Salable Fish by 2 Trawls | | |
|---|---|---|---|---|
| Location | | Lampara Trawl | 400-Mesh Eastern Trawl | |
| Offshore | Drag 91-92 | 1,800 lbs./hr. English sole | Catch rate of trawler "Eagle" towing same location, direction, and speed with net similar to 400-mesh Eastern--2,500 lbs./hr.--mostly English sole. | |
| Offshore | Drag 91-41 | 500 lbs./hr. Dover sole<br>1,500 lbs./hr. sablefish | Drag 91-39<br><br>Drag 91-40 | 1,800 lbs./hr. Dover sole<br>3,000 lbs./hr. sablefish<br>1,200 lbs./hr. Dover sole<br>2,000 lbs./hr. sablefish |
| Offshore | Drag 91-42 | 50 lbs./hr. Dover sole<br>100 lbs./hr. sablefish | Drag 91-43 | 200 lbs./hr. Dover sole<br>350 lbs./hr. sablefish |
| Strait of Juan de Fuca | Drag 91-45 | 900 lbs./hr. all fish mixed (not all salable) | Drag 91-44 | 2,800 lbs./hr. all fish mixed (not all salable) |

Gear: The BCF Lampara trawl was constructed of 3-inch 18-thread nylon web. The net had a 200-mesh long 4-panel body, 240 meshes wide per panel at the mouth, and 40 meshes wide per panel at the junction with the cod end. The wings were 1,225 meshes long, tapering on the top edge from 0 to 240 meshes high. The headrope was a 500-foot section of $\frac{3}{8}$-inch, manila-wrapped steel cable with 130 8-inch aluminum trawl floats attached. The footrope was $\frac{1}{2}$-inch manila-wrapped steel cable 500 feet long. The net was weighted with 500 feet of $\frac{5}{16}$-inch chain hung to the footrope. A 12-foot section of $\frac{7}{8}$-inch chain was used for additional weight on each wing where towing bridle was attached. A special bridle arrangement was used to reduce variation in door attitude with changes

Test fishing in Holmes Harbor and Saratoga Passage, Puget Sound, produced incomparable data. One Lampara tow produced 1,800 lbs. of hake and 100 lbs. of bottomfish, but the bottom body panel was ripped out of the net. Subsequent prospecting with the 400-mesh Eastern produced highly variable catches--with very small quantities of salable fish: 30 to 300 lbs. These test results indicate Lampara trawl is less satisfactory for bottom fishing than conventional 400-mesh Eastern trawl when used from 200 hp. boat (effective towing output of Cobb at 310 r.p.m.).

The trawl door spread with Lampara trawl was about $\frac{2}{3}$ the door spread obtained with 400-mesh Eastern with same length of towing cable out. The bottomfish catch rate of

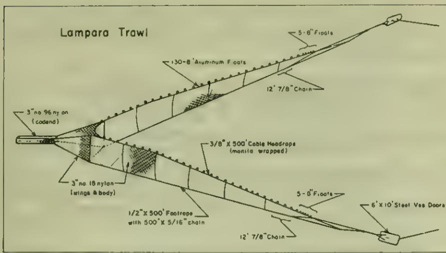



Fig. 1 - Schematic drawing of Lampara trawl rigged for bottom fishing.

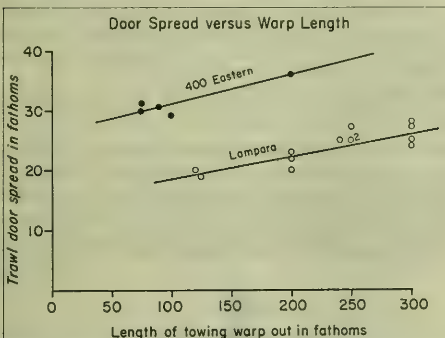



Fig. 2 - Relation of door spread and warp length for the Lampara trawl and 400-mesh Eastern. Both nets were towed at similar speeds over the bottom--Lampara at 310 r.p.m. and 400 Eastern at 240 r.p.m.

Lampara net was always lower in comparative tows than 400-mesh Eastern trawl.

Acoustic Spread Measuring System

Acoustic measuring equipment was operated during all tows in an effort to obtain information on trawl door spread.

Method and Materials: The measuring system consisted of the ship's echo sounder, 2 modified magnetostrictive transducers, and an oscilloscope. The transducers were installed in streamlined fiberglass-reinforced epoxy housings and mounted facing each other, one attached to tailchains of each trawl door. Electro-mechanical towing cable provided a circuit from transducers to boat. The transducers were connected in parallel through a transfer switch in wheelhouse to ship's sounder. An oscilloscope was connected across transducer leads to present a visual display of the signal.

Results: The gear spread measuring system produced useful information on trawl door spread. Unfortunately, the oscilloscope readout system apparently did not function because signal was too weak. The sounder's amplifier, though, increased signal so during most drags a reading was obtained on the recording paper.

Door Attitude Studies

The results of the door attitude studies were inconclusive because the adjustments resulted in only minor variations in spread. Initial attempts indicate that large changes in tailchain length are needed to produce measurable changes in door attitude.

Universal Trawl Evaluation

The Universal trawl, designed to fish on and off bottom, was the principal trawl used in the 1967 offshore hake fishery. Although the trawl was successful from the standpoint of production, its configuration had not been evaluated. Also, since the degree of ribline hang-in has been changed, it seemed desirable to have divers examine the trawl when fished in midwater. The divers measured the mouth opening with strings and depth gauges and photographed the net while towing.

Gear: The BCF Universal trawl body is 650 meshes wide at the mouth and 300 meshes long, with $2\frac{1}{2}$-inch #21 thread nylon top and sides, and $2\frac{1}{2}$-inch #36 thread nylon bottom and wings. The net has a 121-foot headrope with sixty-seven 8-inch trawl floats, and a 121-foot, $\frac{1}{2}$-inch manila-wrapped steel cable footrope with 26 feet of $\frac{5}{8}$-inch chain at each lower wingtip. The 6- by 10-foot V-doors were used to spread the net.

Results: The configuration of the Universal trawl was found satisfactory. The net opened 46 feet vertically and 33 feet horizontally. Although the footrope was hung in too much, and the after part of the body not hung in enough, the net's overall appearance was good.

Mark II Universal Trawl Evaluation

The standard Universal trawl is difficult to tow due to its large size and small-mesh construction. Therefore, a scaled-down, large-mesh version (Mark II Universal trawl), which might be more efficient at taking the faster swimming roundfish species, was designed and built.

Methods: The Mark II Universal trawl was examined by divers and test fished in a hake school. Net measurements with strings and depth gauges and photographs were taken by divers during a midwater tow in Puget Sound. Diver observations were also made during one bottom tow. Test fishing was conducted near the north end of Saratoga Passage, Puget Sound. Three tows were made with the doors on bottom because depth telemetry was not readily available.

Gear: The trawl is of the same design but smaller than the standard Universal net. The mouth is 260, 5-inch polyethylene meshes wide, and the headrope 94 feet long with 67, 8-inch floats attached. The footrope is $\frac{1}{2}$-inch polypropylene-wrapped steel cable with 20 feet of $\frac{5}{8}$-inch chain at each wing tip. The after body intermediate area is made of $3\frac{1}{2}$-inch mesh polyethylene web. All tows were made using the 6- by 10-foot V-doors.

Results: The trawl looked well underwater. It was much easier to tow than the standard Universal net and had a horizontal opening of 36 feet and a vertical opening of 32 feet. With the doors on bottom, the footrope was $3\frac{1}{2}$ feet off bottom.

The trawl was fished successfully on hake. The catch rates in all tows were good considering that the fish were well up in the water column. A catch rate of 12,000 lbs. per hour was obtained on one tow, although the echo sounder indicated most fish were well above bottom and probably not available to the net during the tow. Heavy gilling of small hake occurred in the $3\frac{1}{2}$-inch mesh rear body panels.

Evaluation of Buoyant Long Line Gear

Recent observations by commercial fishermen indicate that long line gear could be made more effective for sablefish if the gangions could be kept off bottom. An experimental skate of gear therefore was put together to test this hypothesis.

Methods: The experimental long line gear was set in shallow water in Puget Sound. A diver examination was carried out after setting, then the gear was left untouched for 3 days. A second diver examination was carried out just before recovery of the gear.

Gear: The experimental long line gear was a 200-foot-long skate with the following components:

| Section | Ground Line Material | Gangion Material |
|---|---|---|
| 1 | 1/4" treated nylon | #36 thread nylon line |
| 2 | 1/4" treated nylon | #3 polypropylene line with polypropylene float |
| 3 | 1/4" polypropylene | #3 polypropylene line with polypropylene float |
| 4 | 9/32" polypropylene | #36 thread nylon |
| 5 | 5/16" crab line | #36 thread nylon with polypropylene float or sponge float |

All hooks were baited with random-sized chunks of fish.

Results: Divers observed that about $\frac{1}{3}$ the baits were missing and more than $\frac{1}{2}$ the gangions were rolled up on the ground line within 30 minutes of setting the gear. The floating elements were not sufficiently buoyant to raise the bait above the level of the line. Numerous fishes were seen feeding on the bait and flat fishes were observed striking at various elements of the gear other than bait at distances up to 2 feet above the bottom.

Note: For additional information concerning this cruise and program work associated with it, contact: Dayton L. Alverson, Base Director, Exploratory Fishing and Gear Research Base, 2725 Montlake Boulevard East, Seattle, Wash. 98102. Tel. 583-7729.

## La Jolla's Information on Ocean and Albacore Aids Fishermen

For the past 7 years from April 1 to October 31, BCF's Fishery Oceanography Center at La Jolla, Calif., has made easier the jobs of west coast albacore fishermen by providing them with an increasing amount of information about the ocean and the albacore. It was in 1960 that BCF scientists routinely began publishing and mailing to fishermen monthly sea-surface temperature charts of the eastern Pacific Ocean. During the summer months, they issued 15-day sea-surface temperature charts for the ocean area just off the west coast where the albacore occur regularly each year. In 1961, the laboratory started pre-season predictions (issued in May) for the seasonal albacore tuna fishery. The annual forecast indicated the region where the bulk of albacore should be present in July, attempted to foretell when the fishery would begin and estimated the relative abundance of alabcore at the beginning of the season. Up-to-date temperature charts issued at

15-day intervals throughout the season helped the fishermen in their scouting operations because albacore distribution appeared directly related to a narrow range of sea-surface temperatures.

Fishermen appreciated the Center's early efforts to provide certain useful ocean environmental information, so La Jolla began to expand the program gradually. The most recent innovations have been: (1) daily radio advisories (begun in summer 1966), (2) continuously updated analyses of the fishery's seasonal progress (included with sea-surface temperature charts in the monthly publication), and (3) special bulletins reporting changes in the ocean environment--taking place or expected.

Its Radio Station Broadcasts Documentaries

The radio advisories are sent out by station WWD, licensed to BCF and located on the campus of the Scripps Institution of Oceanography, adjacent to the Fishery-Oceanography Center. Double sideband voice broadcasts are made twice daily (morning and evening) from June 1 through October 31. Broadcasts include the latest information on albacore catches obtained from research vessels and cooperating fishing vessels, sea-surface temperatures observed at selected points, and weather information. At the end of each 15-day calendar period, the BCF staff also codes and transmits (twice daily for two consecutive days) key isotherms from the 15-day sea-surface isotherm charts routinely mailed to fishermen. The coded message provides fishermen at sea with current information on the location of the 60°-66° F. temperature zone--from which more than two-thirds of the total Pacific coast albacore catches are produced. In the future, a prognostic 15-day sea-surface temperature field also will be included. These advisories are a fast way of reporting significant changes that sometimes occur suddenly in the ocean and atmosphere, affecting albacore distribution and fleet operation.

The radio broadcasts have helped the Center's efforts to provide information on a timely basis. Unfortunately, many fishing vessels do not have radio equipment adequate to receive the broadcasts consistently. These vessels must depend on relay from other vessels with good radio gear. And, in the relay process, much detail and timeliness are lost.

Computer Helps Lab

In summer 1967, full-scale operation began at La Jolla of the U. S. Naval Weather Service Environmental Data Network link. Its master computer facility at Monterey will augment the Center's understanding of oceanographic and climatological events. The Center now receives computer-analyzed products updated at 3-, 12-, and 24-hour intervals. This permits the scientific staff to monitor environmental changes in the north Pacific almost as they occur. One immediate result of this service has been the development of a capability to anticipate environmental events on a scale heretofore impossible. As the staff's experience in using and interpreting the FNWF Monterey products increased, it has successfully remained "on top" of situations that developed rapidly. Now continuous, quickly published reviews of seasonal events are possible; so too timely bulletins when needed.

Problems Remain

The Center's staff believes that expansion and refinement of the ocean information service can advance only as fast as resources and experience permit. There is need to increase understanding of the effect of ocean changes on the distribution of albacore. There still is the problem of obtaining appropriate information on the ocean environment and the fishery on a synoptic (current) basis. And there must be improvement in the means of getting to fishermen information immediately applicable to their operations.

The experience being gained with the west coast albacore fishery is expected to be useful to other fisheries. It may well establish in the future a nationwide pattern.

## 'Market News' Begins 31st Year of Serving Fishing Industry

BCF's Market News Service is beginning its 31st year of providing timely and important information about fish, fishery products and the many-faceted industry to 10,000 subscribers in the U. S. and around the world.


Its network of 7 field offices is located strategically to report the activities in principal fish-landings ports and wholesale centers. Their staffs process a welter of information to provide authentic data that put buyer and seller on an equal footing--and expedite transactions. The Service's reporting ranges from prices paid at the vessel, in wholesale centers for fish and processed fishery products, to research findings about fish populations and developments in fishing gear, fish processing and packaging techniques.

The mimeographed reports of the Service--"Fishery Products Reports," a different color for each office--are issued daily from field offices in Boston, New York, Hampton, Va., New Orleans, Chicago, Seattle, and San Pedro, Calif. A subsidiary station in Baltimore covers the local industry and relays information to its parent office at Hampton.

Market information also is passed to the public by telephone, collect telegrams, or teletype, personal contact, and through the press and radio broadcasts.

'Service' Adapted to Industry Changes

When the Service began in 1937, most fishery market activity was centered on fish landings, wholesale market receipts, and the marketing of wet (iced) fish. In its 30 years, the Service adapted itself frequently to reflect the changes and developments in the harvesting, processing, and distribution of fishery products in the U. S.

Today, Market News Service also reports on a wide variety of processed and ready-to-serve products--fish sticks and portions, other portion-control items, all processed shrimp, and specialty seafood items. And it provides information on fishery products--fish meal, oil and solubles--and future trading in fish meal on New York and London commodity exchanges.

## Seattle Lab to Study an Aleutian Area

BCF's Biological Laboratory in Seattle, Wash., has contracted with the Atomic Energy Commission to study the ocean environment and marine ecology near Amchitka Island in the western Aleutian chain. The project is part of a general study to understand the undisturbed aquatic environment before underground nuclear testing is begun.

The January-February 1968 study will focus on the distribution and abundance of plankton and fishes near Amchitka Island--and on the distribution and magnitude of the ocean currents.

## 10 U. S. Firms Taking Part in London and Milan Fairs

Ten U. S. firms are showing 23 fishery products in food fairs being held at London, Jan. 9-18, and Milan, Italy, Jan. 20-27. Both fairs are aimed at the institutional and catering trade.

The participation of U. S. firms in international food fairs is organized by BCF's Office of International Trade Promotion (OITP). The London Fair is OITP's fifth promotion in the United Kingdom and the first since the pound was devalued. The fair may indicate what effect devaluation will have on British imports of U. S. fishery products.

Excellent Results Obtained

U. S. participation in previous fairs led to new markets for Maine shrimp and frozen lobsters. Also, sales were greatly expanded for salmon, Gulf of Mexico shrimp, and Alaska king crab meat.

# ARTICLES

## CLAM SURVEY OFF VIRGINIA
### (Cape Charles to False Cape)

By Phillip S. Parker* and Lars A. Fahlen**

The third in a continuing series of surf clam (Spisula solidissima) surveys being made by the Bureau of Commercial Fisheries was completed off the coast of Virginia between May 1965 and May 1966. Its purpose was to explore for populations of surf clam; to determine its abundance and distribution and factors affecting its populations; and to collect data on other species of shellfish. Samples were taken at selected survey sites with a 48-inch hydraulic dredge. During the survey, 1,367 stations were occupied, and catches ranged from 0 to 9 bushels of surf clams per tow. Catch rates of 1 bushel per 4 minutes of towing time were obtained at 54 stations. Abundance, distribution, and size of clams varied considerably. Relations were noted between these variations and environmental data collected. Small populations of ocean quahogs (Arctica islandica) were widely scattered.

The surveys were made by BCF in conjunction with the Sea Clam Packers Association of the Oyster Institute of North America. They have become an integral part of the overall BCF study to determine facts relating to the life history and abundance of the surf clam.

During the past few years, the surf clam (Spisula solidissima) has exceeded both the hard clam (Mercenaria mercenaria) and soft shell clam (Mya arenaria) in production (table 1). Total surf clam production in 1965 was a record 44 million pounds of shucked meats (Groutage and Barker, 1967). Over 60 vessels are now engaged in the fishery. The center of the fishery still remains off the coast of New Jersey; 96 percent (42.3 million pounds of meats) of the total landings was made in New Jersey (Groutage and Barker, 1967).

Table 1 - Annual Production of Clam Meats for Three Species of Shellfish, 1961-65

| Year | Surf Clams | Soft Shell Clams | Hard Clams |
|---|---|---|---|
| 1961 1/ | 27,502,000 | 7,363,000 | 14,604,000 |
| 1962 1/ | 30,854,000 | 9,396,000 | 13,295,000 |
| 1963 1/ | 38,586,000 | 9,754,000 | 14,529,000 |
| 1964 1/ | 38,144,000 | 11,030,000 | 14,925,000 |
| 1965 2/ | 44,088,000 | 11,310,000 | 14,470,000 |

1/Source: Fishery Statistics of the U. S., 1961-64.
2/Source: Office of Statistical Services, BCF, Gloucester, Mass.

The surveys are designed to locate and define within each survey area beds of surf clams, to determine the size and extent of these beds, and to evaluate their potential for future commercial harvesting.

### AREA OF OPERATION

The survey was completed in Area II, which lies off the coast of Virginia from about midpoint of the eastern shore peninsula down to False Cape, Va. (fig. 1). Its western boundary extends 54 miles northeastward to a point on the southern boundary of Area III at latitude 37°22' N. and longitude 75°16' W. From this point, its northern boundary follows the south boundary of Area III seaward and extends beyond the southeast corner of Area

*Fishery Biologist,
**Fishery Methods and Equipment Specialist } BCF Exploratory Fishing and Gear Research Base, Gloucester, Mass.

Note: An appendix to this article is available in reprint (Sep. No. 804). For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.



U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 804

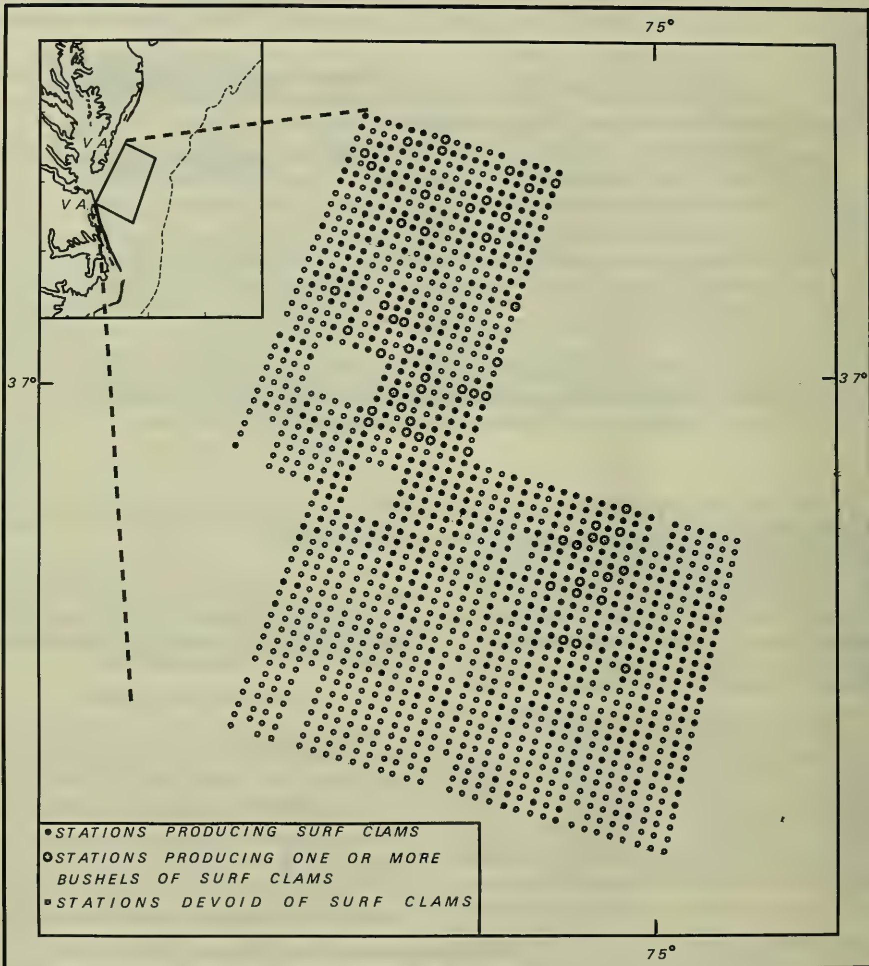



Fig. 1 - Chart of Area II showing location of individual survey stations.

III, until it reaches the 100-fathom contour at latitude 37°05' N. and longitude 74°35' W. From here, its eastern boundary runs southwestward to latitude 36°16' N. and longitude 75°02' W. Its southern boundary is formed by a line connecting this point with False Cape, Va. The area within these boundaries is 2,200 square miles. However, because of the presence of unexploded depth charges and other missiles, most of the northeast quadrant was bypassed, along with the inshore section of the southeast quadrant. About 1,400 square miles were left to survey.

## GEAR AND EQUIPMENT

The survey of Area II was made from the Bureau's research vessel "Delaware," employing the same gear and equipment used in Area III and described by Parker (1967). We experimented to some extent with various manifold jet sizes on the 48-inch experimental dredge, but the resulting changes in water volume and pressure were so small that we were unable to detect any difference in the fishing efficiency of the dredge.

During one cruise, underwater television was used to observe the operation of the dredge fishing on the bottom. We were able to see that the blade of the dredge did not dig into the bottom until the water system was activated to cause the jets of water to dig a trench in front of the manifold. When the water system was shut off, the blade would rise immediately to the surface of the sea bottom. We also saw very little turbidity resulting from the hydraulic action of the manifold jets, and the turbulence caused by these jets was negligible. We failed to see live surf clams on the bottom, but saw many other forms of animal life during the period of television observation.

Attempts to take bottom temperatures with an electronic probe attached to the dredge proved unsuccessful because the transmission cable repeatedly parted between the dredge and the readout meter in the pilothouse.

Samples of material too small to be retained by the main dredge were collected in a small mesh retaining unit in the after cage of the dredge. Samples from this unit were placed in small plastic bags and frozen for later analysis shoreside.

## PROCEDURE

The same general procedure was followed in the survey of Area II as was used during the 1963 survey in Areas IV and VI (Parker, 1966) and the 1964 and 1965 surveys in Area III (Parker, 1967). Each survey station was located at the intersection of predetermined grid lines running generally north to south and west to east (fig. 1). The main or north-south grid lines parallel the 1H5 Loran line in the area, whereas the secondary or station grid lines follow the 1H4 Loran line. We simplified the location of each sampling station and increased the ease of vessel navigation by employing this station system. Owing to the divergence or convergence of these grid lines in any single operational area, some discrepancies will occur in the distances between sampling stations. The discrepancies, however, are not of a magnitude that would cause concern over the reliability of the data. Each north-south grid line was positioned at a distance of 4 microseconds throughout Area II, whereas the east-west grid line interval was established at 12 microseconds.

The standard sampling tow was 4 minutes; however, because of bottom conditions in some sections, the tows were shortened. Several 20-minute simulated commercial tows were also made. Most tows were made at a propeller speed of 100 revolutions per minute, which we assumed gave a towing speed of about 1 knot. The propeller never dropped below 100 r.p.m., but, at times when strong head tides slowed the vessel, the revolutions per minute were increased to compensate for the tides.

At the completion of each tow, the dredge was hauled back aboard the vessel and dumped. The dredge was then returned to the bottom and towed to the next station, at which time the water system was activated and a sample taken.

Between stations or tows, clams and other collected material were measured. Materials were selected from the samples and saved for later analysis. Information on water temperatures, bottom sediments, and catch composition was also taken at this time.

## RESULTS

In Area II, 1,421 sampling sites were occupied. Of these, 1,367 were tows of 2- or

Fig 2 - Typical catch by a hydraulic jet dredge from most of the unexplored areas along the Middle and North Atlantic coast. Note the vast number of shells mixed in with the few live clams.

4-minute duration and the remaining 54 were simulated commercial tows of 20-minute duration.

Catches

Of the 1,367 tows (fig. 2), 717 took no surf clams, 596 caught from 1 surf clam to slightly less than 1 bushel, and 54 took 1 bushel or more (1.0 to 8.8 bushels).

To clarify better the results of the survey in Area II, we have subdivided the area into four sections (fig. 3) as follows: Section A--the northwest part of the area; Section B--the northeast section, which was bypassed in the survey because of the presence of unexploded depth charges; Section C--the southwest section; and Section D--the southeast part of the area.

Section A.--The most extensive populations of surf clams were in this section. The maximum catch rate of 2.2 bushels per minute of towing time, and 70 percent (38 tows) of the tows that caught 1 bushel or more per tow, occurred in Section A. The percentage of tows catching no clams was least from this section. Because of time restriction and bad weather, simulated commercial tows were not made. But, based on results in previous areas surveyed, we expect that catches in excess of 5 bushels per 20 minutes could have been taken in this section.

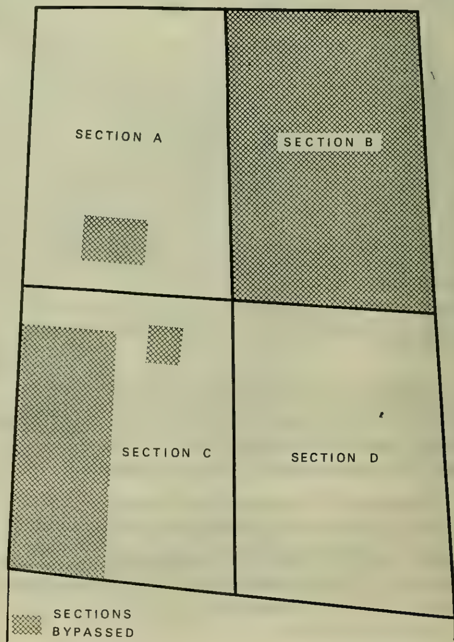



Fig. 3 - Drawing of Area II showing the four main sections and bypassed sections.

The average size of surf clams in this section was less than that in Section D, but considerably larger than that from Section C.

Section B.--Although no attempt was made to sample this section, we assume that surf clams exist there. Populations of surf clams were found north, west, and south of Section B.

Section C.--Surf clams were found in good quantities; however, the population structure in this section was different from the other surveyed sections. Here the number of clams in the commercial-size range (5 inches and above) was only 7.0 percent, compared to 81.0 percent in Section D and 65.0 percent in Section A. The percentage of surf clams in the medium-size range (3 to 5 inches) from Section C exceeded the percentage from the other two sections: Section C - 84.0, Section A - 32.0, and Section D - 18.0 percent.

Section D.--Dense surf clam populations were concentrated in about the middle of this section. However, the number and density of beds producing catches of 1 bushel or more per tow were less here than in Section A. The average size for clams taken over 4 inches (100 mm.) was much greater here than in either of the other two sections: Section D - 6 inches (153 mm.), Section A - 5.6 inches 143 mm.), and Section C - 4.6 inches (116 mm.). Between the eastern boundary of Section C and the dense beds of clams in this section, few surf clams were found. Beyond the outer edge of the dense beds, surf clams were again found in small numbers; however, they were still being taken in the tows made along the last grid line, which would indicate that they may be living beyond Area II.

Results obtained in this section from the 54 simulated commercial tows were poor. All catches took less than 5 bushels. These catches imply that the present population of

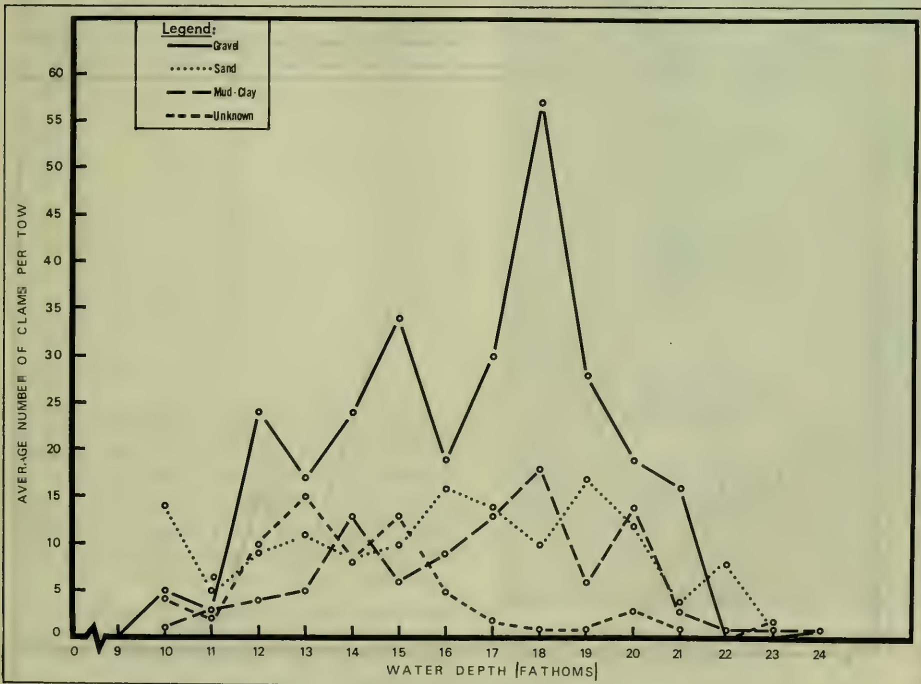



Fig. 4 - Relation of catch rate to water depth and different bottom sediments in Area II.

surf clams in this section would not sustain a commercial fishery.

Bottom Sediments

Area II data were compared to see if any relation could be found between the bottom sediments and the population of surf clams. A relation was found between the mean number of clams caught and the bottom type fished (fig. 4, table 2). The bottom in Area II was divided into four general classifications: (1) sand, (2) gravel, (3) mud, clay or a mixture of both, and (4) unknown. The types of bottom arranged with the most productive listed first are: (1) gravel, (2) sand, (3) mud-clay, and (4) unknown. The mean catch from stations with gravel bottom was 2 times that from sand, 3 times that from mud and clay, and about 6 times that from unknown sediments (table 3).

Table 2 - Catch Rate of Surf Clams by 1-Fathom Intervals for Different Sediments in Area II

| Water Depth | Bottom Soil Types | | | |
|---|---|---|---|---|
| | Unknown | Mud-Clay | Sand | Gravel |
| Fathoms | . . . (Average Number of Clams Per Tow) . . . | | | |
| 9 | - | - | 0 | 0 |
| 10 | 4 | 1 | 14 | 5 |
| 11 | 2 | 3 | 5 | 3 |
| 12 | 10 | 4 | 9 | 24 |
| 13 | 15 | 5 | 11 | 17 |
| 14 | 8 | 13 | 8 | 24 |
| 15 | 13 | 6 | 10 | 34 |
| 16 | 5 | 9 | 16 | 19 |
| 17 | 2 | 13 | 14 | 30 |
| 18 | 1 | 18 | 10 | 57 |
| 19 | 1 | 6 | 17 | 28 |
| 20 | 3 | 14 | 12 | 19 |
| 21 | 1 | 3 | 4 | 16 |
| 22 | 0 | 1 | 8 | 0 |
| 23 | 2 | 1 | 1 | 0 |
| 24 | 0 | 1 | 0 | 1 |

Table 3 - Mean Catch of Surf Clams Taken from Different Bottom Sediments in Area II

| Bottom Sediment | Mean Catch of Clams |
|---|---|
| | Number |
| Gravel . . . . . . . . . . . . . | 25 |
| Sand . . . . . . . . . . . . . | 11 |
| Mud-clay . . . . . . . . . . . | 8 |
| Unknown . . . . . . . . . . . | 4 |

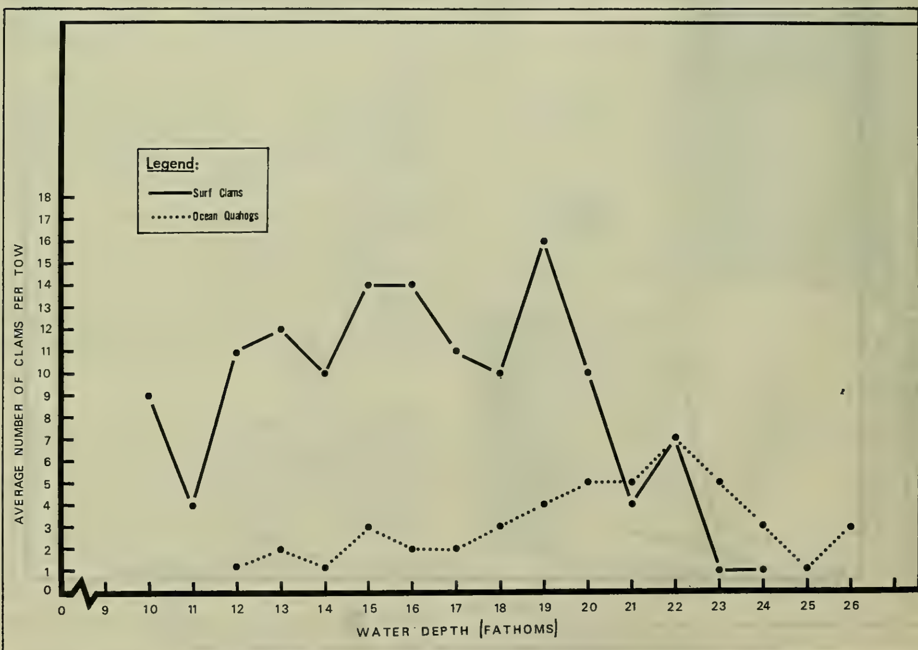



Fig. 5 - Depth distribution of surf clams and ocean quahogs in Area II.

## Water Depths

Water depth and clam density data from Area II were compared to determine if any relation existed between the catch rate and the depth of water (as was found in Areas III and IV). In general, the pattern of catch rate and depth held true here as in the other two areas. The best catches of surf clams were made in those sections where the depth of water varied between 14 and 20 fathoms (fig. 5, table 4). Although the average catch in Area II was less for all depth intervals in comparison to Area III, the largest average catches were made at 19 fathoms in both areas. No surf clam was taken in either area at depths beyond 24 fathoms. The number of sites occupied in Area II in depths beyond 24 fathoms was considerably less than in Area III. The number of shallow water stations occupied in Area III exceeded those sampled in Area II.

Table 4 - Depth Distribution of Surf Clams and Ocean Quahogs in Area II

| Depth of Water | Surf Clams | Ocean Quahogs |
|---|---|---|
| Fathoms | . . . (Average Number Per Tow) . . . | |
| 9 | 0 | - |
| 10 | 9 | - |
| 11 | 4 | - |
| 12 | 11 | 1 |
| 13 | 12 | 2 |
| 14 | 10 | 1 |
| 15 | 14 | 3 |
| 16 | 14 | 2 |
| 17 | 11 | 2 |
| 18 | 10 | 3 |
| 19 | 16 | 4 |
| 20 | 10 | 5 |
| 21 | 4 | 5 |
| 22 | 7 | 7 |
| 23 | 1 | 5 |
| 24 | 1 | 3 |
| 25 | 0 | 1 |
| 26 | 0 | 3 |

## Clam Sizes

Sampling was selective due to the construction of the dredge used (fig. 6). The side, bottom, and top slots of the dredge and rods forming the base of the blade were spaced 2 inches on center. Therefore, some smaller-size surf clams could pass through these openings during normal towing operations. The amount of escapement, we believe, will be fairly constant for any sediment type.

The length-frequency curve plotted for surf clams in Area II follows about the same configuration as for other surveyed areas

Fig. 6 - Size distribution of surf clams taken in a single tow. Most of the medium-size and all of the small-size clams could pass through the slots of the dredge.

(fig. 7, table 5). The peak occurs within the commercial-size range.

The dominant size differed for the three sections of Area II. Clams in the 5.5- to 6.3-inch (140 to 159 mm.) length groups constituted most of the catch from Section A (table 6). In Section C, medium-size clams prevail and very few clams were of commercial size. The percentage of clams in the 5.9- to 6.7-inch (150 to 169 mm.) size groups was greatest

Table 5 - Number of Surf Clams Taken in Area II in Each 10-Millimeter Length Group

| Length Interval | | Surf Clams |
|---|---|---|
| Millimeters | Inches | Number |
| 20-29 | 0 8-1.1 | 5 |
| 30-39 | 1.2-1.5 | 10 |
| 40-49 | 1.6-1.9 | 33 |
| 50-59 | 2.0-2.3 | 83 |
| 60-69 | 2.4-2.7 | 207 |
| 70-79 | 2.8-3.1 | 277 |
| 80-89 | 3.1-3.5 | 452 |
| 90-99 | 3.5-3.9 | 777 |
| 100-109 | 3.9-4.3 | 971 |
| 110-119 | 4.3-4.7 | 593 |
| 120-129 | 4.7-5.1 | 503 |
| 130-139 | 5.1-5.5 | 908 |
| 140-149 | 5.5-5.9 | 1,895 |
| 150-159 | 5.9-6.3 | 2,521 |
| 160-169 | 6.3-6.7 | 1,641 |
| 170-179 | 6.7-7.0 | 387 |
| 180-189 | 7.1-7.4 | 37 |
| 190-199 | 7.5-7.8 | 1 |

Table 6 - Percentage of Surf Clams in Each 10-Millimeter Length Group for the Three Sections of Area II

| Length Interval | | Section A | Section C | Section D |
|---|---|---|---|---|
| Millimeters | Inches | . . . . . . . | (Percent) . . . . . . . | |
| 20-29 | 0.8-1.1 | 1/0 | - | 1/0 |
| 30-39 | 1.2-1.5 | 1/0 | 1/0 | 1/0 |
| 40-49 | 1.6-1.9 | 1 | 1/0 | 1/0 |
| 50-59 | 2.0-2.3 | 1 | 2 | 1 |
| 60-69 | 2.4-2.7 | 1 | 5 | 1 |
| 70-79 | 2.8-3.1 | 2 | 7 | 1 |
| 80-89 | 3.1-3.5 | 2 | 12 | 1 |
| 90-99 | 3.5-3.9 | 3 | 24 | 2 |
| 100-109 | 3.9-4.3 | 4 | 23 | 2 |
| 110-119 | 4.3-4.7 | 4 | 10 | 3 |
| 120-129 | 4.7-5.1 | 5 | 5 | 3 |
| 130-139 | 5.1-5.5 | 12 | 2 | 6 |
| 140-149 | 5.5-5.9 | 26 | 2 | 13 |
| 150-159 | 5.9-6.3 | 25 | 3 | 30 |
| 160-169 | 6.3-6.7 | 12 | 2 | 29 |
| 170-179 | 6.7-7.0 | 2 | 3 | 8 |
| 180-189 | 7.1-7.4 | 1/0 | 1/0 | 1/0 |
| 190-199 | 7.5-7.8 | - | 1/0 | - |

1/Less than 0.5.

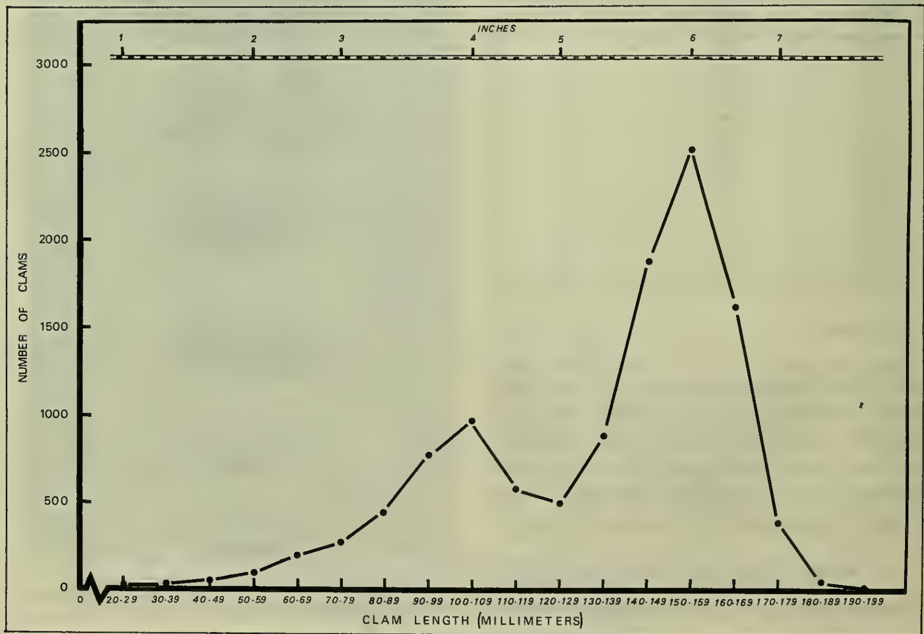



Fig. 7 - Length-frequency distribution of surf clams from Area II.

in Section D. At the same time, the relative number in the medium- and small-size groups was smallest in Section D.

Population

In Area II, the best beds of surf clams were in Sections A and D. These two sections are widely separated--A is just south of Area III, and D offshore and southeast of Section A. Because Section A is just south of Area III, the surf clam beds here are probably a southern extension of the beds in Area III, having their southern limits established by the inflow of water from Chesapeake Bay and shallower waters to the south. Their western or inshore expansion is also limited by shallow waters overlaying unproductive bottom sediments. Seaward, their range is controlled by the depth of water.

Although these beds of surf clams are in the commercial producing range, they do not equal the density of those just to the north in Area III. The structure of these surf clam beds, however, resembles closely those in Area III. Their densities in relation to bottom sediment and depth follow the same pattern as observed for Area III. Relations between the number of commercial-size clams and smaller clams seem to be the same here as in other areas surveyed. These environmental factors, therefore, appear to control the surf clam densities and possible bed expansion in Section A.

In Section C, the number of medium-size surf clams in the population may have been the result of some phenomenon that caused the spawn or larval of the surf clam to concentrate in vast numbers. Most of the clams caught here measured between 2.8 and 5.1 inches (70 and 130 mm.) long. Whether these vast numbers of medium-size clams will reach commercial size is another question.

The big difference between the surf clam population structure in Sections A and D was in their maximum size. In Section D, the mean maximum size was greater than in the other two sections. In all other respects, the length frequency curve and population structure was about the same as in Section A.

The best or largest beds of surf clams in Section D were located in its north-central part, and very few surf clams were taken offshore of this segment. Inshore of this segment, vast numbers of surf clam shells were taken in each tow, and often the bag and cage were filled with shells.

In Section D, the size of the surf clam beds may be limited somewhat by the fact that this section may be located at, or near, the optimum southern range limit of the surf clam. If this is true, the chances of an increase in the bed sizes or densities in Section D are remote. Therefore, the development of a commercial fishery in this section is unlikely--unless the price per bushel paid to the fisherman is increased sufficiently to compensate for the expected reduced daily catch.

In all sections of Area II, the possibility of establishing a commercial fishery will depend upon whether or not the price of clams will increase enough to compensate for the lower catch rates. Overall, the surf clam beds in Area II cover an area of considerable size, but within this area the surf clam densities are less than in Areas III and IV.

Ocean Quahogs

Ocean quahogs (Arctica islandica) were scattered in isolated locations throughout the area. Concentrations of this species never equaled those found in Areas III, IV, and VI.[1/] Generally only one or two ocean quahogs were taken with surf clams at any one survey site. Few ocean quahog shells were noted in the catches, which indicates that the ocean quahog population was small throughout Area II. In all probability, Area II is near or at the southern limit of the range of this species. We do not assume that the population structure of the ocean quahog will be the same in the deeper offshore waters as that found in Area II.

## DISCUSSION

The main differences between Area II and Area III (Parker, 1967) were in the size and density of surf clam populations. The density of surf clams in Area II was about one-half that observed in Area III. Other differences were the hydrographic and ecological variations between areas. These variations may have caused the difference in density of surf clam populations.

We assumed that one of the causes for the natural environmental conditions existing in Area II might be the flow of water from Chesapeake Bay. Its greatest effect would be felt in Section C of Area II lying directly in the

1/Originally designated as survey Areas V, IV, and I.

mouth of the Bay, decreasing as the distance offshore from the mouth of the Bay increased. If the currents were strong enough to carry the richer Bay waters offshore to Section D, where the largest-size clams were caught, this might explain at least part of the cause of this growth. To the north, in that part of Section A uninfluenced by the inflow of Chesapeake Bay waters, the surf clam population was very similar to that in Area III.

In any comparison between areas, one should keep in mind the probability that many unmeasurable environmental facts may be present in all large areas. Any one of these factors may have a tremendous effect on the total biological and physical characteristics within an area; any one factor could influence the surf clam population to a degree that would be unexplainable from the data obtained during our standard surveys. These factors may have a greater influence on surf clam populations than is realized. Therefore, before logical long-range management plans can be made most, if not all, of these factors will have to be understood and considered.

Why do we find in some areas with about the same depths and bottom sediment types dense populations of surf clams in one section and only a few or none in another? Will a small population become better populated in the next generation, or will it take many generations? Will poor producing sections ever produce sufficient clams for commercial harvesting? If they do, what will be the long-term effect of cropping on the surf clam populations?

The growth pattern of surf clams in Area II is about the same as in Area III. The young clam goes through a period of very rapid growth, after which the annual growth increment declines steadily until death. Surf clams may reach a maximum length of 8 inches or more.

## SUMMARY

The third BCF surf clam survey was conducted in Area II off the coast of Virginia, between Cape Charles and False Cape, during 1965 and spring of 1966.

Out of 1,367 tows made, 717 took no surf clams, 596 caught from 1 surf clam to slightly less than 1 bushel, and 54 took 1 bushel or more.

Fifty-four simulated commercial tows made in the area produced very poor results. No tow caught 5 bushels of clams in 20 minutes.

The same relation between bottom sediments and surf clam densities was observed in Area II as in Areas III, IV, and VI. Also observed was a close relation between the size of catch and water depth; optimum catches occurred between 14 and 20 fathoms.

Owing to the dredge design, only a few clams less than 2.0 inches (50 mm.) were collected. As in all previous surveys, the dominant clam length was between 5.5 and 6.7 inches (140 mm. and 170 mm.).

Throughout the area, considerable variations were observed in the size, abundance, and distribution of surf clams. Extensive segments were almost void of the surf clam, while others had good populations.

Still smaller populations of ocean quahogs were observed in this area than in Areas III, IV, and VI.

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# FAO STUDY TOUR IN USSR

By Dr. Dayton L. Alverson*

[For several years, FAO has sponsored study tours in the Soviet Union for developing nations. While the topics of these tours change from year to year, they deal generally with technical fisheries matters. The subject of the 1967 study tour, Sept. 21-Oct. 18, was "Fish Behavior as Related to Fishing Techniques and Tactics." It was selected to augment the FAO conference of the same title in Bergen, Norway, Oct. 19-28. Dr. Alverson was a lecturer on the Soviet study tour and chairman of the FAO conference. Below are some impressions of his trip.--Ed.]

There is a high degree of integration in Soviet fisheries science. This is evident from the studies of the All-Union Research Institute of Marine Fisheries (VNIRO), the field laboratories, and the Soviet Academy of Science. A statement at the opening ceremony of our tour suggested that Soviet fisheries research was strongly motivated by the desire to understand behavior--in order to harvest fish and to improve survival of fish populations and the productive capacity of the oceans.

Some of our meetings were held in the Georgian Scientific Research Institute in Batumi, which is on the southeast coast of the Black Sea, near Turkey. The institute is under the line authority of VNIRO.

They Seek Important Answers

Many lecturers were from the Soviet Academy of Science. I was impressed with the fact that Academy scientists were conducting research and evaluating its results from the standpoint of their application to improving Soviet fisheries. There seemed to be no stigma attached to their involvement in applied research. These scientists were studying sensory physiology with particular emphasis on understanding the sensory modalities involved in detecting various stimuli within the fishes' environment.

They are asking and seeking answers to the following types of questions: By what means do fish detect sound? How is the sound transmitted internally? What are its sensory capabilities regarding sound intensity and frequencies? How can or does a fish orient to sound? Does a fish have orientation capabilities in the near field and, if so, how is this achieved? Similar questions were being asked about vision.

The results of these studies seem to flow to the behaviorists who were, more often than not, involved in VNIRO or other field projects. These researchers attempted to utilize the information on sensory physiology and general behavior to determine in what means knowledge of behavior could be used to improve harvest capabilities.

ACOUSTICAL HERDING

Perhaps the most exciting and certainly one of the most interesting lectures presented was by Prof. A. Shein of VNIRO. Actually, the work is being done at PINRO (Polar Research Institute of Marine Fisheries and Oceanography). Shein discussed three areas of interest to the future of high seas fisheries. They involved acoustical herding, acoustical counting, and near-bottom detection methods. The information on acoustical herding was by far the most interesting and revealing development that I have seen in the Soviet Union in the past several years. Apparently, the Soviets have been investigating biological sounds produced by fish and mammals, and the individual and group reaction of fishes to various biological and nonbiological sounds.

In investigating the behavior of cods and herring in the North Atlantic, the Soviets determined that they could drive midwater schools of cod and herring down to within 2-3 meters of the seabed by using low-frequency

*Base Director, BCF Exploratory Fishing and Gear Research Base, Seattle, Washington.



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sound. The original experiments involved (1) detecting schools of herring or cod; (2) transmitting a signal of about 1,000 cycles for a period of about 15 seconds; the signal strength at one meter from the microphone was 2,000 bars and the signal nondirectional. This brought about an immediate response on fish schools observed on the echo sounder. The fish moved rapidly toward the seabed but soon began to ascend in the water column. The signal would then be reproduced and a similar reaction would occur. However, the amplitude of vertical movement decreased with each successive reproduction of the 1,000-cycle sound. The fish apparently acclimate to this nonbiological sound rather quickly. Subsequent changes in the power or character of the sound, that is, simple or compound combinations, would no longer bring about the desired response.

Biological Sounds

The second phase in the investigation dealt with application of biological sounds, or as the Soviets put it, "sound which had biological meaning to the fishes involved." Recordings were made of various mammals and fishes which preyed on cod or herring, and a variety of predator sounds were thus catalogued. In subsequent experiments with herring and cod, low-frequency biological sounds were used to drive fish toward the seabed. In a serial presentation of a number of echograms, there was a rather dramatic response to these biological sounds. Schools of fish as much as 50 meters above the seabed (cod and herring) moved rapidly down toward the ocean floor and remained there during periods the biological sounds were being broadcast. For herring, the effect was more dramatic and appeared to represent almost a total change in school distribution. The sounds used for herring represented a species of tooth whale. Dr. John H. S. Blaxter, University of Aberdeen, Scotland, Prof. Toshero Kuroki, Hokkaido University, Japan, and I did not doubt that the echo tracings, as shown, implied a dramatic breakthrough in acoustical herding and one which could have a real impact on the utilization of ocean resources. The idea here is <u>not to eliminate the behavior that leads to escape</u>, but to increase the density of fish within the influence of a harvesting device. This coupled with Soviet experiments now underway to eliminate, via electronarcosis, behavior that leads to escape from the harvesting devices, could bring about a major increase in efficiency.

The Soviets stated that they had increased catches utilizing the acoustical herding method from 300 to 500%. We did not, however, see any actual comparative tow data. All the lecturers, however, were convinced that the echograms were legitimate. The validity of the Soviet claims was later verified by the fact that Scottish investigators working out of Aberdeen have had similar results in their studies.

Echo Counting and Bio-acoustics

Prof. Shein commented further on acoustical studies in the Soviet Union. They are apparently investigating the use of various echo sounders ranging from 10 KC to 200 KC and are deeply involved in acoustical counting procedures. Their equipment and approach seem to be similar to those now being used at Lowestoft by David Cushing's people and perhaps not as far along, but certainly well ahead of the U. S. push in this direction. The Soviets claim to be using now the world's largest crystals in their acoustical studies, particularly for the application of piezoelectrical effect for passive and active sound studies. According to Shein, they have developed a technique that allows the study of fish close to the seabed. My impression was that it was similar to the white line techniques used in other countries; however, it completely blocks out the bottom echo.

On the day following Shein's lecture, we went out on the Black Sea to have a first-hand look at the various acoustical equipment aboard the research vessel, "Boridev." It was literally a floating acoustical laboratory with twenty-some different echo-sounding devices--both foreign and domestic--and a variety of acoustical detection (listening) instruments. The vessel was not involved in the acoustical herding work described by Shein, but did have more electrical equipment aboard than all BCF vessels combined. On the other hand, I saw nothing in electronic equipment that impressed me as being substantially different or better than the rest of the world uses.

Opto-motor Reactions
and the Secondary Stimuli

For the next several days we heard a good deal about other physiological and behavioral studies being conducted by the Soviets, and there are areas of work worth mentioning. One uses the so-called opto-motor reaction to

improve catching efficiency. A lecture by D. S. Pavlov dealt with the opto-motor reaction and peculiarities of fish orientation in a stream of water.

The opto-motor reaction is a behavioral response that takes place in the animals following a visual moving object or reference point; it is characteristic of many classes of animals. The main biological significance of opto-motor reaction in fish is that it enables the animal to orient itself in a water stream, providing visual reference points are available. The opto-motor reaction is an unconditioned reflex or "reo-reaction" and occurs in early stages of a fish's development. It is a characteristic of the overwhelming majority of fishes, and occurs when fish do not have tactile contact with the bottom. Apparently, it is very important in midwater fishes and hence in midwater fishing activities. The Soviets are stressing the application of this knowledge to the harvest of midwater species. By altering the character of the background (webbing), it is expected that one can create an opto-motor reaction in certain parts of the trawl and eliminate it in others. This would eliminate swim-out, which now occurs in some midwater trawl fishing.

Increasing Harvest Efficiency

Pavlov was followed by D. V. Radakov, who also lectured on how knowledge of behavior could be employed to increase harvest efficiency. According to Radakov, the Soviets feel that escape from trawls, purse seines, and other active gears can be decreased by creating a "secondary stimuli." That is, if the fish's attention or sensory modalities are taxed by secondary stimuli, these may confuse and even inhibit the behavior that might lead to escape from a particular type of gear (this relates to acoustical herding). Apparently by creating certain predator sounds in an area around trawls, the tendency of fish to dart away from the gear in attempts to avoid it may be eliminated completely. The success of these studies, however, was not well-documented to the lecture group. It is an area being investigated.

CUBA'S FISHERIES DEVELOPMENT

At the end of our stay at Batumi, each participant was asked to give a short summary of his nation's fisheries development work. Here is some information I abstracted from the Cuban presentation.

Prior to 1959, the fisheries of Cuba were of a subsistence nature. There was no organized national effort to develop and utilize the fisheries potential surrounding the island. At that time, production was approximately 25,000 tons1/ and marketed through "middlemen." After the revolution, the fishermen were organized into cooperatives under a National Institute of Fisheries. This organization involves itself with catches, management of fishing fleets, marketing, distribution, and fisheries research.

32 Cooperatives Control 3,000 Boats

The Cuban fishing industry is organized into approximately 32 cooperatives, which control about 3,000 boats. About 50 vessels fish on the high seas. Eight modern stern trawlers have been acquired from Spain.2/ Fishing on Georges Bank has or was scheduled to begin in 1967.3/ Production in 1967 has exceeded 100,000 metric tons4/ and the target for 1970 is 175,000 metric tons. The breakdown of the 1970 planned catch, by species, although not clearly provided by the lecturer, was: 30,000 metric tons tuna; 40,000 metric tons trawl--hake, flounders, etc.; 50,000 metric tons cod; and 45,000 metric tons other.

The large new fishing port at Havana, which was financed by the Soviets and is staffed with Soviet technicians, now provides logistic support for most distant-water fishing activities. Closed circuit television is used to monitor port activities.

3 Labs Do Research

The research activities are coordinated by three laboratories: (1) marine biology, (2) oceanology, and (3) laboratory of fishing technology. There are now 56 Cuban scientists

1/FAO gives Cuba's 1959 production as 28,200 metric tons.--Ed.

2/Cuba bought 26 fishing vessels: 6 stern trawlers that fish for cod in the Northwest Atlantic, mostly off Labrador. The remaining 20 units bought from Spain were tuna longliners. (For details, see CFR, Jan. 1966, p. 71.)--Ed.

3/No Cuban vessels fished during 1967 on Georges Bank. A few were sighted on their way to or from Labrador.--Ed.

4/There is no evidence for this statement.--Ed.

assigned to these labs, 30 administrators, 90 crew members on research vessels, 16 Soviet scientists and 3 FAO scientists. The Soviets have provided two medium refrigerated trawlers as research vessels, apparently on loan from VNIRO, and 9 smaller ships ranging from 16-25 meters. The overall budget of the Cuban oceanographic and fishery research programs was said to be 1.2 million pesos in 1967.

(The fisheries development program obviously is being supported technically and financially by the USSR.)

## MURMANSK, THE "BARREL CITY"

We went on to Murmansk. The city, which dates back some 50 to 60 years, now has 300,000 people. This in itself does not seem particularly important until one realizes that almost the entire population depends on the fishing industry, although there are also fur farms, small industries, and military activities in the region. The Murmansk fishing fleet operates from the North Atlantic west to the coasts of America. More than two billion pounds, or a million metric tons of fish, now are landed annually in Murmansk. The catch is made in the North Sea, the Faeroes, Icelandic region, Greenland, Newfoundland, and Georges Bank.

### Fleet and Docks

The fleet is made up of many standard SRT-type side trawlers, BMRT's, and support vessels ranging up to 19,000 tons. We were given a tour of the docks and fishing facilities. Compared with those I have seen in other areas of the world, the Murmansk dock facilities are extremely modern. There are many railway-supported mobile cranes used to load and unload the large number of fishing vessels calling at Murmansk. The access to the docks appears good. The fishing fleet, particularly the support vessels, is modern.

We visited several SRT catcher vessels, several BMRT's, and a support ship. I was impressed by the fact that the skippers on all these boats were relatively young and acutely aware of what government people were doing in the area of fisheries. Of the half dozen or so vessels that I boarded, all but one were apparently foreign built; they were constructed in either Poland, East Germany, or Western Europe. Most were powered with German engines and had a large variety of Eastern and Western European electronic devices aboard.

### Visit to Fish-Processing Plant

The study tour included a visit to one of the processing plants in Murmansk where a large variety of fish products was preserved. We observed smoking of redfish, cod, and catfish (wolf eels); filleting of various demersal (bottom dwelling) species; and lunched on about 22 different products made by the plant. Again, most processing machinery appeared foreign made. The plant did not seem particularly well laid out, and many activities were not automated. Safety features were entirely lacking. In contrast to the dock facilities and vessels, the plant seemed to me a rather inefficient operation, at least from the standpoint of using workers.

### Barrels

One quickly becomes aware when moving around the docks or fish-processing plants, or even around the countryside, that there must be an awful lot of herring making their way in barrels to Murmansk. If there are 300,000 people in Murmansk, there are at least 30 million barrels. They are stacked every where: on the docks, throughout the city, and in the surrounding countryside. So I dubbed Murmansk, the "Barrel City."

### PINRO

In addition to Murmansk's large fishing activities, one of the larger fisheries research laboratories is centered there. The PINRO lab or labs are in downtown Murmansk. A large building houses the labs involved in marine studies in the North Atlantic. The group at PINRO includes 600 persons, of which 200 are scientists, and the remainder staff technicians, secretarial help, etc. I was particularly interested in some work in fish behavior and the methods used to gain a better insight into this field.

### Study Behavior of Demersal Fishes

We looked at a hydrostat being used to investigate the behavior of demersal fishes. For all practical purposes, the hydrostat can be considered a cylinder sealed at each end and with a number of ports for the observer. It has a maximum operational depth of 600 meters, and a life support system of approximately 12 hours. The hydrostat weighs 2.4 tons and can be operated from a vessel at drift or when anchored. Although it has its own oxygen and life support system, there is direct

contact via cable to the research vessel. The device is lowered much like the bathyscaph or sphere used by Beebe to a predetermined depth, and then observations are made on fish life. About 70 drifts had been made with this particular hydrostat by scientists at the PINRO laboratory. The drifts ran from four to eight hours. Generally, the device is lowered to within one to two meters of the seabottom, and observations made on demersal fishes as the hydrostat drifts slowly over the ocean seabed. A number of excellent photographs were shown to the study tour by Dr. Kiselev, who was one of the main investigators studying fish behavior from the hydrostat.

### A Submersible

The PINRO lab has designed and apparently has now under construction a new, self-contained, independently operated, submersible. Called the "North I", it will have a depth capability of 2,000 meters and a speed of five knots. It will be assigned the investigation of fish behavior in their natural environment and their reaction to fishing gear. It also may play a role in fish detection and scouting. Although the fisheries submarine "Severyanka" still is in use, it is having increasing maintenance problems. Its use in future fisheries studies seems questionable.

### PINRO Organization Impressive

I was impressed by the organizational structure at PINRO and how programs were designed and developed and related to the overall national goals of fish production. At least one-half the PINRO budget (2.5 million rubles or about $2.75 million) comes from the fishing industry, and the other half from the Fisheries Ministry's budget. This PINRO budget does not include research vessel support. Overall program planning and objectives are evaluated by industry and scientific leadership. It is obvious that the lab's mission is closely related to fish production and efficient utilization of the Murmansk fleet.

A relatively large group is involved in predicting changes in year-class strength for the various species exploited. The purpose of prediction does not concern management in the sense of regulation; it is applied to reallocate fleet deployment. Its purpose is to make the best use of the Murmansk fleet--to put greater emphasis in those areas where natural production looks favorable, and to diminish the effort on stocks in which natural production looks poor. How well this actually works is difficult to say.

## BOROK'S BIOLOGICAL INSTITUTE

Our next stop was Borok, which is north and east of Moscow. Borok is a village of about 2,000 people and sits on the southwest side of the Rybinsk Reservoir. The whole town is built around the Academy of Science's Biological Institute for Inland Water Research.

The Biological Institute, directed by I. D. Popanov, was established in 1959 and is made up of independent laboratories. Some of the more important include Laboratory of Hydrology and Hydrochemistry, Laboratory of Microflora and Microbiology, Laboratory of Ecology and Physiology, Laboratory of Zooplankton and Zoobenthos, Laboratory of Zoology and Parasitology, Laboratory of Ichthyology and Physiology of Lower Invertebrates.

### Electrical Fishing

While the group at Batumi apparently is directing its energy to using the anode reaction for capturing fish, at Borok they are experimenting with alternating current to stun fishes in front of a trawl. The objective involves agitation and electronarcosis. Electro-fishing was demonstrated on the Rybinsk Reservoir aboard the new 120' research vessel, which was well equipped with chemical and physiological laboratories and acoustical equipment. The electro-trawl displayed has a series of electrodes along the ground rope, uses AC power, non-pulsed. (Voltage and power output and other details can be obtained from the author.)

Dr. Poddubnii lectured on acoustical tracking. The work is similar to that conducted on salmon in the Pacific Northwest. However, the acoustical tag now being used on sturgeon and other species seems a little more sophisticated, and the tracking system allows one to record the position and depth of up to nine fish at the same time. The tag was built in somewhat of a saddle shape, with the power source on one side and acoustical transmitting equipment on the other. The Soviets had tracked the migration of sturgeon in the reservoir and in the Volga River, and suggested various methods the fish were using to orient themselves.

## FAO - BERGEN

There were about 100 scientists at the conference of 30 nations, with strong representation from the Soviet Union (they sent a ship to Bergen from Murmansk), Great Britain, Germany, France, and Norway. Australia, Canada, and the U. S. were represented. There were individuals from all parts of the globe. The strongest laboratory representation came from PINRO, VNIRO, the Atlantic Research Institute for Marine Fisheries and Oceanography (ATLANTNIRO), the Marine Laboratory at Aberdeen, Scotland, and the Fisheries Laboratory at Lowestoft, England.

The conference was divided into five major topic sections: (1) field observations on fish behavior and important fisheries; (2) methods and techniques for studying fish behavior in their natural environment; (3) experimental studies of fish reactions to physical and biological stimuli, both in their natural and in a controlled environment; (4) experimental studies of fish reactions to moving and fixed objects in order to clarify reactions to fishing gear; and (5) application of observations and experiments on fish behavior in designing fishing gear and tactics.

The discussions were highlighted by differences in opinions, particularly concerning swimming speeds and the use of theoretical models for crystallizing needed inputs for improving the design of fishing devices. Work parties were organized to consider in greater detail: (1) use of submersibles in behavior studies; (2) short-term migration or movements of fishes--their effect on fishing strategy; (3) possibilities of herding, aggregating, and controlling and/or restricting movements of fish for the purpose of improving harvest; (4) sensory physiology--its possible contribution to behavior studies and design of fishing gear; and (5) experimental design of behavior studies and design of facilities.

Approximately 63 papers were submitted and will be published in the proceedings. The proceedings should be available early in 1968 in limited numbers and should provide an excellent reference for those interested in fish behavior, particularly as it might be applied to capture and harvest.

I was particularly impressed with the state-of-the-art of acoustical counting and its application to both behavior and population studies. Both English and Norwegian investigators are attempting to resolve the problem of acoustical signatures--identifying acoustical targets as to fish species. The Norwegians appear to be making some progress.

I suspect that the impact of the papers presented on the future of fisheries will be of more importance than that at many other conferences.

## FISH GET ULCERS TOO!

Fish, like humans, have ulcer problems. Kenneth Higgs, field officer of the Metropolitan Toronto Conservation Authority, told an authority meeting that 250 dollars will be spent this year on drugs to keep fish in Authority ponds free of ulcers and other ailments. The Authority raises its own game fish. ("Current Affairs Bulletin.")

# EXPERIMENTAL TRAWLING AND POT FISHING FOR GIANT ALASKAN PRAWN

By Doyne W. Kessler*

A research cruise sponsored jointly by industry and BCF was conducted to determine the feasibility of trawling for spot shrimp (Pandalus platyceros). New BCF-developed midwater trawls and combination systems employing standard trawls with hydrofoil doors were fished in areas of suspected spot shrimp concentrations. In 21 bottom drags, 689 pounds of spot shrimp were taken. Five days of shrimp pot fishing (47-50 pots per day) produced 929 pounds of marketable shrimp.

The availability of giant Alaskan prawn or spot shrimp (Pandalus platyceros) in southeast Alaskan waters has long been known to local fishermen. Unlike pink shrimp (Pandalus borealis) and side-stripe shrimp (Pandalopsis dispar), which occur in large concentrations over flat trawlable bottoms, spot shrimp seem to occur on rough, rocky bottom types where conventional trawls cannot be used. Consequently, commercial fishing gear has been limited to shrimp pots. Because of this fishing gear limitation, the spot shrimp fishery has remained a small operation producing shrimp mainly for home use and, occasionally, for the fresh shrimp market.

Interest in commercial fishing for spot shrimp has expanded within the last few years. The large size, superior quality, and year-round availability make this shrimp ideal for an off-season small-boat fishery. BCF is now conducting exploratory fishing and gear research studies to delineate the distribution and abundance of spot shrimp--and to determine the most efficient type of gear for harvesting this valuable resource.

The research cruise represented the first commercial shrimping for research purposes in Alaska. It was made in April and May 1967. The project was initiated by a commercial fisherman, Bruce Joyce, skipper-owner of the vessel "Bull Moose," of Bellingham, Wash. He felt that spot shrimp may exhibit a diurnal vertical movement. Nakat Packing Company furnished the "Nancy Rose," skippered by John Kristovich of Ketchikan, Alaska, a veteran of more than 10 years of spot shrimping. The BCF Exploratory Fishing and Gear Research Base at Seattle, Wash., furnished hydrofoil doors, a telemetry system, several trawl nets, and a gear expert during the first part of the cruise. The BCF Exploratory Fishing and Gear Research Base at Juneau, Alaska, furnished technical assistance during the second phase. This cruise was a commercial operation run by commercial fishermen.

This report gives the results of the Nancy Rose cruise.

## EXPERIMENTAL TRAWLING

The first part of the cruise was an attempt by commercial fishermen to capture spot shrimp using various trawls and the telemetry system that was developed by the BCF Seattle base.

### Methods and Gear

Drags were made in several bays and inlets in the Ketchikan area of southeast Alaska where previous fishing with shrimp pots had indicated concentrations of spot shrimp (fig. 1). Because most of these areas were too rocky for trawling with conventional gear, systems that use hydrofoil doors, telemetry equipment, and standard and experimental trawls were tried. By positioning the trawl off bottom, it was possible to fish areas too rocky for conventional trawling. Surprisingly, some areas of rough bottom could be trawled on bottom using this system. The following trawling gear was used:

*Fishery Biologist, BCF, Exploratory Fishing & Gear Research Base, Juneau, Alaska 99801



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1. 40-foot flat shrimp trawl.
   hydrofoil doors
   8 - 8-inch diameter plastic floats (17 floats used on first five tows)
   50 pounds of weight on footrope

2. 72-foot semiballoon Gulf of Mexico shrimp trawl.
   hydrofoil doors
   40 pounds of weight on footrope (removed for some tows)
   10-fathom bridles

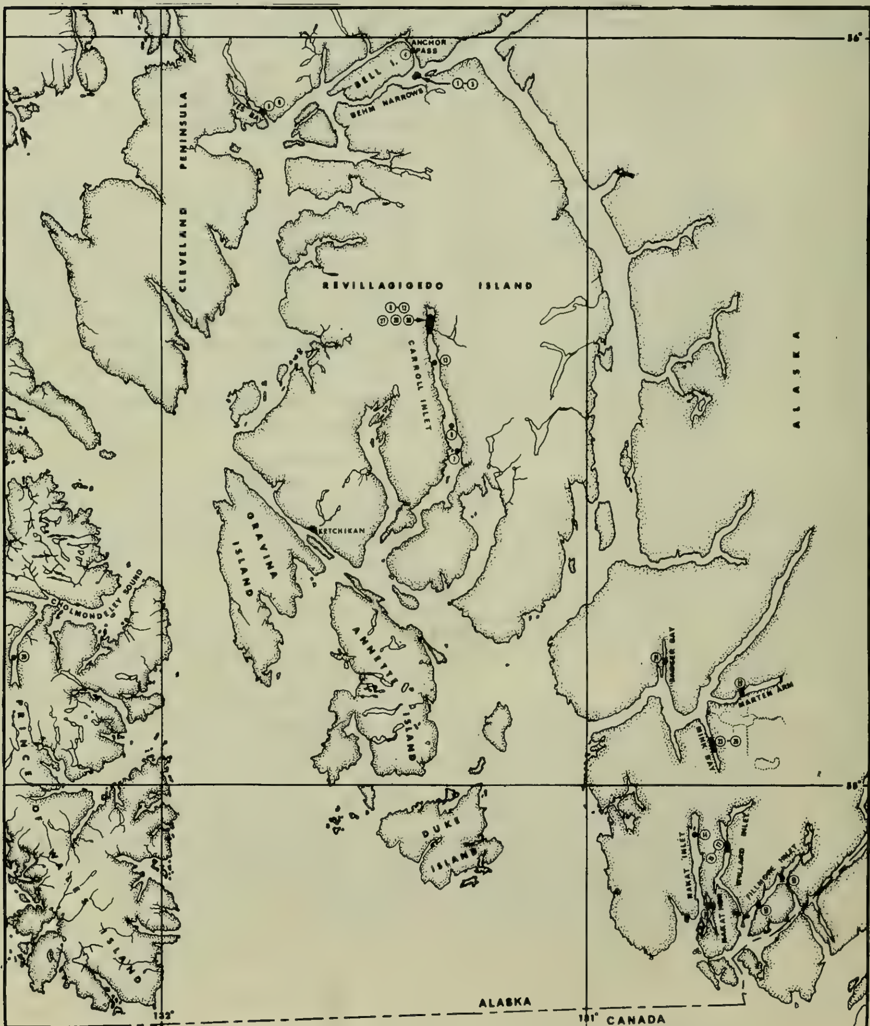


Fig. 1 - Location of 30 trawl tows taken during Nancy Rose cruise.

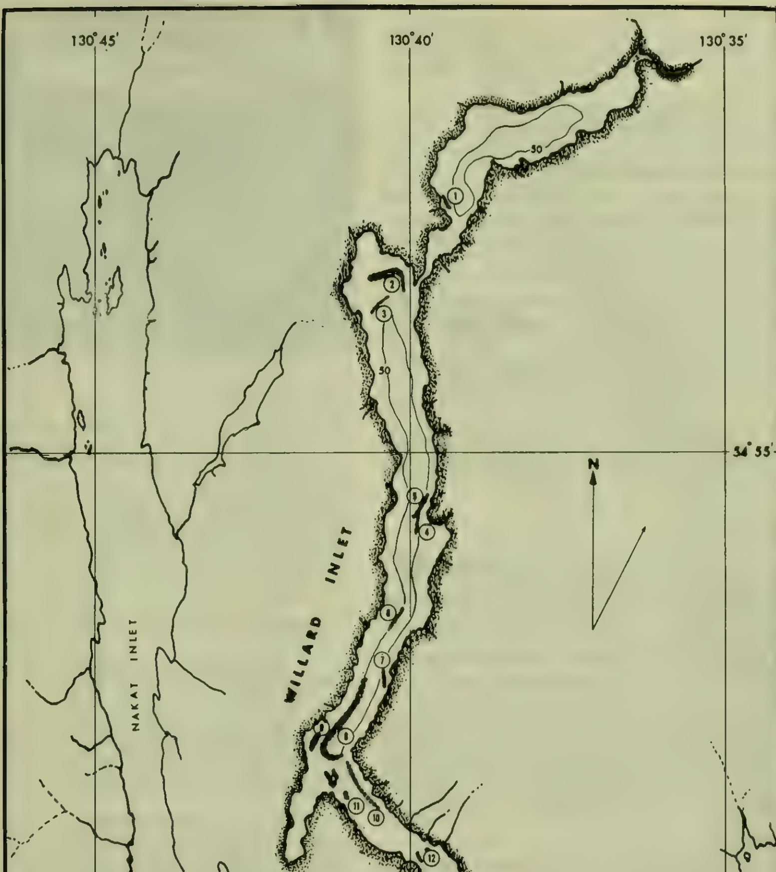



Fig. 2 - Location of shrimp pot sets in Willard Inlet during Nancy Rose cruise.

3. BCF Exploratory Fishing and Gear Research Base, Seattle, Wash., developed midwater trawl, Anchovy No. 1.
   hydrofoil doors
   10-fathom bridles

Results of Trawling Tests

No significant amounts of spot shrimp were taken by trawling during this cruise. Thirty drags over a 21-day period caught only 689 pounds of spot shrimp, nearly all taken "on bottom" (table 1[1/]). Catches of spot shrimp were greater in the early evening and at night than during daylight. The largest catches of spot shrimp (225 pounds per 105-minute drag and 160 pounds per 85-minute drag) were taken on bottom near the head of Carroll Inlet.

Fig. 3 - Commercial shrimp pot used during the last phase of Nancy Rose cruise.

## POT FISHING

The last 6 days of the cruise were devoted to pot fishing to compare the effectiveness of a commercial shrimp pot operation with the trawling effort.

Methods and Gear

Shrimp pots were fished in Willard Inlet and Mink Bay, a tributary of Boca de Quadra Inlet (fig. 2). Several different sizes and shapes of pots were used; however, the basic design was a two-tunnel pot with 2 by 3 by 3-foot rectangular metal frame covered with $1\frac{3}{4}$-inch stretch mesh nylon webbing (fig. 3).

Most posts were fished singly--one to a buoy line. However, one "longline" with 10 pots was also used. All pots were baited with fresh hair seal meat hung in the center of the trap. Pots were usually fished overnight but, occasionally, were fished longer periods.

Results of Pot Fishing

During 5 days of fishing, 985 pounds of marketable shrimp were taken. Willard Inlet produced 929 pounds for an average catch of 6.5 pounds of shrimp per pot (table 2[1/]). An overnight set of 47 pots took only 56 pounds of shrimp in Mink Bay. Spot shrimp, which averaged 22 tails per pound, were more than 90 percent of the pot catches. Small quantities of coonstripe and pink shrimp were also taken.

## CONCLUSIONS

Results of the Nancy Rose cruise show:

1. Bottom trawling took more spot shrimp at night than during daylight.

2. In some areas, spot shrimp can be taken by small shrimp trawls rigged with hydrofoil doors; however, trawling does not seem to be as effective as shrimp pots.

It is hoped that the close cooperation between industry and BCF exhibited by this cruise will lead to more joint projects with considerable value to the fishing community.

1/All statistics are in the appendix to reprint (Separate No. 806) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.

# INTERNATIONAL

## U. S. and USSR Extend Fisheries Agreements

The United States and the Soviet Union agreed on Dec. 18, 1967, to extend for one year the provisions of two fishery agreements concerning the northeastern Pacific Ocean. Talks leading to the extension began in Washington, D. C., on Dec. 7.

The first, a 3-year Kodiak (Alaska) agreement, was signed Dec. 14, 1964. It was designed to alleviate the conflicts between fixed king crab pot gear operated by U. S. fishermen and mobile gear operated by Soviet fishermen. It established areas near Kodiak Island in which fishing with mobile gear was forbidden during certain months.

The second agreement, for one year, was signed Feb. 13, 1967. It established areas of the high seas off Washington and Oregon in which the Soviets were not to fish in order to permit access of U. S. vessels to key fishing grounds for ocean perch. Also, it designated certain areas contiguous to the U. S. exclusive fishing zone in which the Soviets would not fish to protect U. S. sport fisheries and other small-boat operations. It also established areas of substantial total size within the U. S. contiguous fishery zone, particularly near the Aleutian Islands, in which Soviet vessels were permitted to fish and/or conduct cargo transfer operations.

Both Nations Desired Changes

In considering the agreements, each side thought some modifications were desirable. The U. S. delegation wanted expansion and additions to high-seas areas where Soviet fishing does not take place off Oregon and Washington because certain areas important to the U. S. trawl fisheries were not covered. Also, in view of the growing king crab fisheries in Alaska in areas other than Kodiak, the U. S. also wanted to add to the agreement some seasonal protective measures to minimize gear conflicts in these areas. Further, the U. S. wanted more protection for the Kodiak crab fishery through expansion of closed areas and extension of closure period.

The Soviet delegation took the position that Soviet concessions had been inadequately compensated. They wanted additional areas within the U. S. contiguous fisheries zone to fish and/or load cargo.

The discussions were inconclusive. It was decided that the agreements should continue unchanged for another year. Since the king crab quota agreement in the Eastern Bering Sea will come up at the same time, it was understood that all three agreements would necessarily be considered together.

The agreement was signed for the U. S. by Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State, and for the Soviet Union by M. N. Sukhoruchenko, Deputy Minister of Fisheries of the USSR.

## 10 Nations Sign London Pact on North Atlantic Fishing Conduct

Ten of the original 18 countries that established the London Convention on Conduct of Fishing Operations in the North Atlantic have signed the Convention. After signing, instruments of ratification must be deposited in London. When 10 are received, the Convention comes into force. The signatories include Denmark, France, Ireland, Portugal, U.K., the USSR, West Germany, Norway, Belgium, and Italy.

The Convention specifies regulations for marking fishing vessels and gear, sound and light signals, vessel operation, and mutual inspection of fishing vessels beyond national fishery limits. (U. S. Embassy, Copenhagen, Dec. 1, 1967.)

## Ireland Joins GATT

Ireland joined GATT (General Agreement on Tariffs and Trade) as a full contracting party effective Dec. 22, 1967. GATT now has 75 contracting parties and 12 other countries with some other form of membership or association.

## FAO Plans Conference on Port and Marketing Facilities

FAO is aware of the need to improve port handling and marketing facilities to handle increased catches. Some developing nations are not benefiting fully from larger catches because they are unable to handle them at the port and distribute them. Some developed nations face the same difficulties.

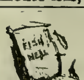
To help alleviate this problem, FAO is planning to hold a special congress in Bremen, Germany, in September 1968. The subjects will include: planning ports, investments needed, administration and operation, and the building of facilities.

## Report on World Fish Meal Production

The International Association of Fish Meal Manufacturers (IAFMM) is the source for the following data on world fish meal production:

| | July | Aug. | Sept. | Jan.-Sept. | |
|---|---|---|---|---|---|
| | 1967 | 1967 | 1967 | 1966 | |
| | (Metric Tons) | | | | |
| Canada | 15,928 | 12,864 | 8,444 | 72,901 | 70,512 |
| Denmark | 17,482 | 19,981 | 15,290 | 114,164 | 83,338 |
| France | 1,100 | 1,100 | 1,100 | 9,900 | 9,900 |
| German Federal Republic | 6,891 | 6,588 | 6,609 | 56,653 | 55,207 |
| Sweden | 414 | 1,040 | 987 | 5,197 | 3,864 |
| United Kingdom | 7,714 | 6,641 | 5,847 | 60,713 | 66,310 |
| United States | 31,014 | 26,031 | 14,326 | 137,009 | 141,358 |
| Angola | 3,511 | 1/ | 1/ | 2/24,118 | 36,211 |
| Iceland | 18,232 | 13,331 | 17,631 | 93,956 | 121,489 |
| Norway | 33,527 | 51,018 | 39,904 | 406,793 | 355,704 |
| Peru | 524 | 699 | 51,673 | 1,082,158 | 1,105,111 |
| So. Afr. (including S.-W. Afr.) | 35,975 | 37,470 | 42,920 | 331,188 | 245,221 |
| Belgium | 375 | 375 | 375 | 3,375 | 3,375 |
| Chile | 13,457 | 6,158 | 11,588 | 98,851 | 183,133 |
| Morocco | 1/ | 1/ | 1/ | 1/ | 21,300 |
| Total | 186,144 | 183,296 | 216,694 | 3/2,496,976 | 2,502,033 |

1/Data not available.
2/Data available only for January-July 1967.
3/Includes production in Angola through July only.
Note: Japan does not report to IAFMM monthly fish meal production. Estimate for 1967 of fish meal and other animal meal (mostly fish meal) is 350,000 metric tons; 347,000 metric tons in 1966. (Foreign Agricultural Service, Tokyo, Nov. 15, 1967.)



## Food Protein Will Be Extracted from Crude Oil

The British Petroleum Company (BP) has announced that it will build a factory to extract food protein from crude oil. It would be used first in animal feeds, much like fish meal and herring meal, but it is expected that ultimately the product can be used in human foods. Construction of the factory will begin in 1968, near Marseilles, France, and production will be initiated in 1970. The factory will cost 45 million Danish kroner (US$6,000,000) and have a capacity of 16,000 tons of protein concentrate annually.

A Competitive Product

The concentrate resembles fine brown sugar and will be competitive with natural products of the same quality. The company states that 100 tons of crude oil yield 90 tons of fuel oil and 10 tons or protein concentrate. The new process is expected to have a significant influence on the world food problem because the protein shortage could be made up by only two percent of the world's annual production of crude oil. Other petroleum companies are also working to produce protein from petroleum. ("Børsen," and "Berlingske Tidende," Nov. 22, Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24, 1967.)

# FOREIGN

## CANADA

### EXPERIMENTAL MIDWATER TRAWLING PRODUCES LARGE HAULS

A typical Nova Scotia 100-foot scallop dragger, converted to midwater trawling, made a 121,000-pound catch of pollock in one short tow in mid-November 1967. It was the spectacular culmination of a 5-month project carried out jointly by the Federal and Nova Scotia Governments and the fishing industry. A single haul of demersal (bottom-dwelling) fish never before was made on Canada's east coast by a vessel this size.

The huge drag was one of 4 that loaded the vessel, the "Lady Anna," with 207,000 pounds of pollock. Fishing on the eastern edge of Stellwagen Bank, she made her catch in 13 hours of fishing and 4 hours of actual dragging time. The length of the drags varied from 20 minutes to two hours. Catches were made in 32-34 fathoms. The fish were taken from one to 15 fathoms off sea bed.

The first drag yielded 40,000 pounds, the second 16,000, the third 30,000--and the fourth the 121,000-pound haul.

#### German Vessels Use Trawl

Midwater trawling for herring has been successfully carried out by very large German vessels. Lady Anna's net is as large as theirs, although the vessel is considerably smaller. It is powered by a 765-hp. diesel engine. Special deck machinery was installed for the project. Superstructure changes were necessary to accommodate the midwater trawl, which is shot and towed over the stern although the cod end is emptied over the starboard side.

The Lady Anna's success is an important breakthrough in the Atlantic herring fishery now expanding rapidly. While fishing for herring in the Bay of Fundy and on Georges Bank, the Lady Anna made numerous single hauls of 40 to 50 tons of spawning herring. Until 1967, herring never had been taken in commercial quantities by midwater trawl off Canada's east coast by Canadian vessels.

#### The Net

The net used is a 1,400-mesh German midwater trawl, 300 feet long and 70 feet wide. Its opening is spread by two hydrofoil otter boards, each about 1,400 pounds. The vertical opening varies with the speed of the boat from 36 to 70 feet, but the opening for catching fish usually is about 48 feet. (Department of Fisheries, Canada, Nov. 23, 1967.)

* * *

### HERRING PRICES TUMBLE IN BRITISH COLUMBIA

Herring prices in October 1967 were dropping in British Columbia (B.C.) because the market for B. C. herring fish meal and oil had dwindled. In contrast, supplies of Peruvian and Norwegian fish meal products, vegetable oils, and other marine oil products had increased. Members of the Fisheries Association of B. C. offered herring fishermen C$9.60 a short ton, compared with C$17.60 paid since 1965. (Exvessel prices for herring in B. C. are not comparable to those of certain other countries because B. C. processors furnish much of the equipment used in the fishery, along with benefits such as a medical plan.)

The herring fishery industry was having marketing and price problems because of a continued increase in operating costs. Such conditions were expected to continue throughout the rest of the herring season. ("Facts on Fish," Fisheries Association of B. C., Oct. 26, 1967.)

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### FISHERY LANDINGS IN ATLANTIC PROVINCES EXPECTED TO INCREASE

Canada's Atlantic Provinces' fishery landings will increase an estimated 2-3 percent per year between now and 1970, according to a government report. This growth rate is slightly higher than the last decade's. An average 2-percent growth is forecast from now to 1980.

Obstacles to catch increases are limitation of fish stocks and increased international

Canada (Contd.):

competition for the resources. (U. S. Embassy, Ottawa, Nov. 23, 1967.)

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## FISHERIES TRENDS, JANUARY-AUGUST 1966-67

Canadian sea fisheries landings (including Newfoundland's) from January through August 1967 were 1.5 billion pounds with an exvessel value of C$96.1 million. (Excludes seaweeds.) In the 1966 period, landings were 1.6 billion pounds worth $107.1 million. These data are in the August 1967 "Monthly Review of Canadian Fisheries Statistics."

The landings and exvessel values of principal species were:

| | January-August | | | |
|---|---|---|---|---|
| | 1967 | 1966 | 1967 | 1966 |
| | Landings | | Value | |
| | . . (1,000 Lbs.) . . | | . . (1,000 C$) . . | |
| Atlantic Coast: | | | | |
| Cod . . . . . . . | 393,931 | 442,019 | 17,228 | 19,491 |
| Haddock . . . . . | 78,500 | 81,558 | 5,226 | 5,825 |
| Pollock . . . . . | 23,008 | 24,217 | 898 | 967 |
| Flounder & sole . | 156,250 | 136,592 | 5,241 | 4,585 |
| Herring . . . . . | 475,900 | 256,685 | 5,145 | 2,915 |
| Ocean perch . . . | 84,483 | 103,608 | 2,189 | 2,832 |
| Swordfish . . . . | 2,711 | 3,126 | 1,361 | 1,511 |
| Lobsters . . . . . | 27,437 | 28,890 | 17,491 | 16,474 |
| Scallops . . . . . | 8,799 | 12,305 | 4,818 | 4,747 |
| Pacific Coast: | | | | |
| Halibut . . . . . | 19,917 | 30,674 | 4,988 | 10,977 |
| Herring . . . . . | 100,453 | 166,652 | 1,674 | 2,780 |
| Salmon . . . . . | 99,416 | 136,755 | 29,248 | 32,706 |
| Cod . . . . . . . | 7,769 | 18,636 | 545 | 1,291 |

* * *

## REINSTATES DOGFISH MARKETING ASSISTANCE PLAN

Canada's marketing assistance program to produce dogfish flaps, initiated in 1966, was scheduled to be reintroduced toward the end of 1967. The assistance will be payment to fishing companies of a maximum of 11 Canadian cents a pound on production of skinned dogfish flaps. Companies are required to pay fishermen a minimum of C$50 a short ton for round fish, or 13.5 cents a pound on unskinned dogfish flaps, on a delivered basis, for all dogfish purchased under this plan.

### Money Provided

A total of $24,000 has been made available. This will provide for the production of about 200,000 pounds of dogfish flaps.

There is a ready market in Germany for these flaps. Companies also are hopeful of selling some skinned carcasses in the United Kingdom. (Department of Fisheries, Canada, Nov. 23, 1967.)

* * *

## FOOD AND DRUG DIRECTORATE SAYS FPC CAN BE WHOLESOME

The Food and Drug Directorate of Canada's Department of National Health and Welfare is satisfied that fish protein concentrate (FPC) can be made from whole fish, and that it can be wholesome, nutritious, and safe. In Canada, as in the U. S., the presence of viscera, intestines, and other parts not normally used in preparing a food for humans was once considered objectionable by some people.

### Will Not Violate Food & Drug Law

The section of the Food and Drugs Act stating that no person shall sell food consisting wholly or partly of any disgusting material has been the authority under which sale of a food could be prohibited. However, officers of the Food and Drug Directorate now believe it is possible to manufacture FPC from whole fish that would not violate the section. Other sections of the Food and Drug Act will require amendment when FPC becomes available in Canada. (Department of Fisheries, Canada, Oct. 25, 1967.)

# EUROPE

## Norway

### REPORT ON CANNED SARDINE INDUSTRY

Production of brisling this season should be about 550,000 cases ($\frac{1}{4}$'s), a larger number than the last three-year average of 430,000 cases. However, during recent years, exports and home sales have been about 500,000 cases (they were fewer in 1965). Production, therefore, is not larger than needed to maintain sufficient stocks of various kinds for carryover into the new production season.

It is not possible to forecast what the remaining refrigerated quantity of raw material will give of the various types of cans. As matters now stand, stocks of $\frac{1}{16}$ brisling are too small, and stocks of cross-packed have not reached the necessary quantity either. Up to now, sales of brisling for export are about 45,000 cases lower than at the same time last year. This is due almost exclusively to smaller sales to Great Britain. The U. S. and Canada are about on last year's delivery levels.

#### Sild Production Lags

The situation is different for small sild: production does not keep pace with sales. Since the end of May 1967, stocks have been decreasing despite producers' interest in obtaining raw material. Stocks are now much lower than normal for this time of year. Even if production were intensified for the remainder of the season, it would be difficult to fill stocks sufficiently. Recently, it also has been difficult to obtain raw material. This is still true for small fish for $\frac{1}{16}$ cans and for cross-packed. At the same time, it has not been possible to obtain any considerable quantity of $\frac{1}{4}$ club sardines, for which there is some interest.

#### Exports to Several Markets Up

There is a marked increase of exports to several markets--South Africa and Sweden, and especially to the U. S. The increase to the U. S. may have resulted in part from Maine's poor fishing and reduced sardine production. On the other hand, sales to West Germany have decreased notably, from 50,000 cases to 40,000 cases in 1966. By the end of August 1967, only 17,500 cases had been exported. The 1967 quantity will probably be reduced to 25,000-30,000 cases. However, total exports, as of September 9, were the largest since 1950. ("Norwegian Canners Export Journal," Oct. 1967.)

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### REFRIGERATED-SEA WATER VESSEL BUILT

The first fishing vessel in Europe to feature the refrigerated-sea water (RSW) system for tank transport of catches is a 170-ft. purse seiner launched recently in Norway. Catches will be transported from the fishing grounds in refrigerated sea water in 9 tanks with a combined capacity of about 630 tons. Herring can be kept aboard without deterioration for six days; mackerel for 12 days; tuna for 14 days. The 6-million-kroner vessel (almost US$860,000) is scheduled to be delivered to Norwegian owners in January 1968. It features also a new sea-water circulation system developed by the builders. (Export Council of Norway Press Service, Nov. 1967.)

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### SALMON FISHING IS GOOD

Because of poor salmon catches in the Baltic during spring 1967, two Swedish vessels sailed to Bodø in north Norway to fish the Norwegian Sea. About 10 Danish cutters also were there. All made good salmon catches. One Swedish vessel caught 6 tons of salmon in 3 months; the fish were sold in Denmark. It is expected that several Swedish salmon boats will fish the north Norway salmon grounds next spring. ("Berlingske Tidende," Nov. 5, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24.)

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### REPORT ON EXPORT TRENDS OF FISHERY PRODUCTS

Norwegian exports of frozen fillets for Jan.-Sept. 1967 declined about 7 percent from the 1966 period. Shipments of herring, cod, and haddock fillets declined significantly.

Canned fish exports through Sept. were 20,276 metric tons, slightly below comparable 1966 shipments. Exports of small sild sardines were up about 10 percent, but brisling

Norway (Contd.):

shipments were down 22 percent. The main canning season for brisling and sild sardines begins in the spring.

| Product | Jan.-Sept. 1967 | Jan.-Sept. 1966 |
|---|---|---|
| | . . (Metric Tons) . . | |
| Frozen fillets: | | |
| Haddock | 7,792 | 10,912 |
| Cod | 19,571 | 20,792 |
| Coalfish | 15,423 | 13,512 |
| Herring | 6,481 | 8,207 |
| Other | 4,953 | 4,674 |
| Total frozen fillets | 54,220 | 58,097 |
| Frozen herring | 8,829 | 12,365 |
| Canned fishery products: | | |
| Brisling | 4,358 | 5,619 |
| Small sild sardines | 9,727 | 8,784 |
| Kippers | 2,478 | 2,429 |
| Shellfish | 389 | 568 |
| Other | 3,324 | 3,452 |
| Total canned fish | 20,276 | 20,852 |
| Fish meal | 341,193 | 183,121 |
| Herring oil, crude | 89,371 | 49,195 |

Industrial Fish

Norwegian exports of fish meal through Sept. 1967 were up 86 percent from 1966. The large stocks on hand at the start of 1967 contributed to the gain. Landings of fish for industrial purposes continued at a high level in early 1967. Fish meal output was running slightly ahead of first-half 1966. The gain was due to larger landings of capelin and mackerel. ("Fiskets Gang," Oct. 26, 1967, and Oct. 27, 1966.)

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BIGGEST FISHING VESSEL COMPLETED

A 1,560-GRT stern trawler has been delivered to a Norwegian fishing company. The 20-million-kroner (US$3 million) vessel, biggest in the fishing fleet, is equipped to produce a maximum of 60 metric tons of fillets a day. The freezing rooms can store 1,300 tons of fillets. The trawler now is being tested on various fishing grounds. (Export Council of Norway, Nov. 1967.)

## Denmark

REPORT ON FISHING INDUSTRY, JAN.-SEPT. 1967

Landings of fish in local ports by Danish craft during January-September 1967 were 808,000 metric tons--about 28 percent above the 1966 period. Landings of both cod and flatfish were up about 10 percent over the 1966 period; catches of herring and brisling were up 35 percent. Catches in the "other fish" category (includes such industrial species as sand eels and Norway pout) were up 60 percent. The supply of pond trout was little changed from 1966.

Landings in Danish ports by foreign vessels were up about 10 percent--to 134,000 tons from the 121,000 tons of 1966.

Production of Processed Products

There was a 12-percent increase in production of sterile canned items, to 9,800 tons, and a 10-percent decrease in fresh and frozen fillets, to 66,000 tons. Since 1967 landings of cod and flatfish of approximately 176,000 tons were about 10 percent higher than in the 1966 period, the decline in fillet production shows further diversion of those supplies to fresh fish markets. This became evident during the previous 3 months and continues to reflect the price decline in western markets for frozen blocks of cod fillets.

Heavy landings of industrial fish in January-September 1967 resulted in a 44-percent increase over the 1966 period in production of fish meal, oil, and solubles. Fish meal production was 107,000 tons and oil about 44,000 tons.

Exports

Although fishery exports in Jan.-Sept. 1967 increased 13 percent in quantity over the 1966 period (259,000 tons to 292,000 tons), value increased less than 2 percent. For edible products, decline in value was produced primarily by the substantial drop in value of fillets exported.

Among industrial products, declines in value of fish meal and oil exports reflected price drops in 1967 of around 25 percent from January-September 1966. The quantity and value of pond trout exported were up slightly. The sterile canned category continued to show a 20-percent increase in quantity and a 10-percent increase in value over the previous year.

Exports to the U. S.

All categories of fishery exports to the U. S. declined in 1967 from the 1966 period,

Denmark (Contd.):

except canned products. These showed a slight increase in quantity but a decrease in value.

Total fishery exports to the U. S. in Jan.-Sept. 1967 totaled 5,600 tons, compared with 7,000 tons a year earlier. Frozen cod-fillet blocks exports predominated: 4,000 tons, down 28 percent in quantity and over 40 percent in value. Although this decline is substantial, the figures reflect improving U. S. market conditions during the third quarter of 1967; the January-June data had shown declines of 60 percent in quantity and 70 percent in value compared with the 1966 period.

Exports of pond trout, the other major frozen commodity shipped to the U. S. in 1967, nearly doubled the 1966 period's in quantity and value.

Shipments of canned sprats, herring, and mussels all increased in quantity, although values were little changed. Shrimp, the other major canned item purchased by the U. S., declined in quantity and value. The first 1967 Danish export to the U. S. of an industrial fish commodity occurred during the third quarter when 50 metric tons of fish solubles were shipped. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 13, 1967.)

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## NEEDS FISHING VESSEL CREWS

About 75 cutters fishing for edible fish and 25 fishing for industrial fish in the Danish west Jutland port of Esbjerg are either without crews or are very poorly manned. The situation is said to be similar in all major Danish fishing harbors. Some large North Sea cutters have sailed to the dangerous Fladen Ground with only 2 crew members aboard. Many men left fishing when better-paid jobs were readily available ashore; there are many who could be reemployed readily on the cutters. The situation has become so serious that many vessel owners may have to cease operations. ("Vestkysten," Nov. 2, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26.)

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## STORM DAMAGES US$2 MILLION WORTH OF FISHING GEAR

Denmark's 12,000 pound-net fishermen have totaled their losses from the hurricane that struck northern Europe on Oct. 17, 1967. Immediately following the storm, it was estimated that 75 percent of the pound-net gear had been destroyed. Questionnaires were sent by the Danish fishermen's association to provide a basis for estimating the total loss. It now has been calculated at US$2 million.

### The Losses

About half the estimated loss was for lost and damaged nets and piling; the remainder resulted from loss of fishing time and catch. Some pound-net fishermen, including two of the largest, lost all their gear.

The association hopes to take up the matter of disaster assistance with the Ministry of Fisheries in the near future. Pound-net fishermen normally ready their gear for the spring fishery during winter. So action should be taken soon. The yearly production from the Danish pound-net fishery is worth about US$5 to $7 million. ("Borsen," Dec. 7, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Dec. 8.)

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## FAROESE MAY LOSE CANADIAN FISHING GROUNDS

Faroese fishermen may lose valuable cod fisheries off Canada because of the latter's new 12-mile fishing limit. These fishing operations provide incidental catches of porbeagle. Canada has carried on bilateral negotiations with 8 countries that will be affected by the extension of fishery limits: Norway, Denmark, France, Great Britain, U. S., Spain, Italy, and Portugal. The only Danish fishermen affected by the revision are those of the Faroe Islands. ("Politiken," Nov. 20, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24.)

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## EXPORTS MUSSELS TO THE NETHERLANDS

A new fishery for blue mussels (Mytilus edulis) has developed at the Danish west coast port of Esbjerg. Dredge catches are brought to Esbjerg from the fishing grounds at nearby Ho Bay. Then, using an old gravel sorting machine, the mussels are cleaned and sorted.

The fisherman who initiated the enterprise has contracted to supply 20 metric tons of

Denmark (Contd.):

mussels a day. He found the Dutch would pay three times the price per ton now paid in Denmark. He has leased 2 cutters and his operation employs 10 men. Dutch importers send trucks to Esbjerg to transport the mussels to Holland. ("Vestkysten," Nov. 13, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26.)

## Netherlands

### FISH OIL PRODUCTION AND IMPORT INCREASE

Production of fish oil by the Netherlands for first-half 1967 of 865 metric tons was up about 8 percent from Jan.-June 1966; imports more than doubled--64,019 tons compared with 31,588 tons. The doubled imports of fish oil resulted from low prices for Peruvian fish oil; most imports went into stocks.

Fish oil exports were off from 1,760 tons in the first 6 months of 1966 to 1,304 tons in 1967. Exports dropped in favor of hydrogenated oil exports, which consist chiefly of evaporated fish oil. Stocks on hand of 23,241 tons, as of July 1, 1967, were appreciably above the 17,765 tons in 1966. (U. S. Foreign Agricultural Service, Hague, Nov. 22, 1967.)

## United Kingdom

### DEVALUATION IS MIXED BLESSING FOR FISHING INDUSTRY

Devaluation of the British pound sterling will be a mixed blessing for the fishing industry. It should affect favorably the demand for British-caught fish. But its possible effects on industry costs are not so favorable, particularly on fuel oil, the second highest cost in fishing vessel operation. If wage increases are restrained, however, there should be a distinct short-term improvement in industry earnings. British exporters now have a substantial advantage over exporters from other fish-producing countries that have not devalued their currencies. ("Fishing News," Nov. 24, 1967.)

#### Imported Fish More Expensive

Imported fish will be more expensive, but Britain is not a large importer of fish products. The U. S. imports very little from her. But in 1966, the U. S. shipped to the U. K. a little more than 21 million pounds of edible fishery products worth US$14 million. Since British importers will have to pay more pounds for those same imports, they probably will reduce purchases.

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### WHITE FISH AUTHORITY RAISES INTEREST RATES ON FISHERY LOANS

The White Fish Authority of the United Kingdom changed interest rates on loans effective September 9, 1967.

Fishing vessels, new engines, nets, and gear:

On loans for not over 5 years: 7 percent, increase $\frac{1}{8}$ percent.

On loans for over 5 years but not more than 10: $7\frac{1}{4}$ percent, increase $\frac{1}{8}$ percent.

On loans for over 10 years but not more than 15: $7\frac{3}{8}$ percent, increase $\frac{1}{8}$ percent.

On loans for over 15 years but not more than 20: $7\frac{3}{8}$ percent, no change.

Processing plants:

On loans for not over 20 years: $7\frac{3}{4}$ percent, increase $\frac{1}{8}$ percent.

The rates on loans made before September 9 remained unchanged. ("Fish Trades Gazette," Sept. 23, 1967.)

## France

### EXPERIMENTAL TUNA FISHING IN MEDITERRANEAN

Experimental tuna seining for 45 days in the Gulf of Genoa, mostly between Nice and Corsica, produced very satisfactory results. In August 1967, 400 tons of tuna were caught by 2 vessels fishing about 30 miles offshore. As soon as the news reached the southern ports, about 20 other vessels sailed for Nice from Port-Vendres, Agde, Marseilles, and other ports.

France (Contd.):

Fishermen have caught at the same time in the same schools both "red tuna" (bluefin) and "germon" (yellowfin). The greatest part of the catch was sold in the fresh fish markets of southwest France. Part was sent to the canneries of the west because there are no canneries in southern France.

2 Tuna Migrations

Observations indicate that two migrations of tuna take place in the Gulf of Genoa--in the spring and in the summer.

The same observations have been made on the coast of Port-Vendres, where tuna fishing seems to be developing.

Until recently, the Gulf of Fos, near Marseilles, was the principal center of tuna fishing. But it seems to be deserted more and more by schools of fish. Both fishermen and ichthyologists have observed that the tuna have been scared off by work on the new port of Fos-sur-Mer, where mines are frequently set off. ("France Peche," Oct. 1967.)

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FISHING FLEET NEARED 14,000 VESSELS AS 1967 BEGAN

The French fishing fleet totaled 13,906 vessels (287,992 gross tons) with a total of 908,676 horsepower on Dec. 31, 1966.

The number declined by 749 from 1960 to 1965 but increased by 340 in 1966. Small vessels (under 50 tons) and very large ones (over 500 tons) accounted for the rise.

Growth of Fleet Over Past 6 Years

| Date | Number of Units | Overall Gross Tonnage | Aggregate Power |
|---|---|---|---|
| Dec. 31, 1960 | 14,315 | 255,181 | 687,850 |
| Dec. 31, 1965 | 13,566 | 287,776 | 880,556 |
| Dec. 31, 1966 | 13,906 | 287,992 | 908,676 |

Tonnage Increases

Overall gross tonnage increased between 1960 and 1966 by 32,811 tons, or 12.8 percent. It did not vary appreciably in 1966. The increase in tonnage of large craft and 25- to 50-ton vessels was compensated for substantially by the decline in tonnage of medium craft. The decrease in 25- to 50-ton vessels was particularly evident. The aggregate tonnage of very small craft has not varied significantly.

Power Capacity Changes

Fluctuations in power capacity have been more considerable than those involving number and size of vessels. The overall power capacity of the fishing fleet increased by 32 percent between 1960 and 1966, and by 3.2 percent during 1966, corresponding to an additional 28,120 horsepower. Despite its size, this is less than the average increase of the 5 preceding years, which had been 39,700 horsepower. ("La Peche Maritime," Aug. 27, 1967.)

## West Germany

FIRMS TO LEASE FISHING CUTTERS

Fisheries enterprises in Bremerhaven and Cuxhaven, West Germany, are interested in leasing under advantageous conditions Icelandic, Norwegian, and Faroese cutters for use in the herring fishery. An inquiry about renting 30 cutters has been sent to Norway and one regarding 10 cutters has been sent to Iceland. One fishing boat owner in the Faroese has been invited to rent his vessels. ("Politiken," Nov. 14, 1967.)

## East Germany

DELIVERS TRAWLERS TO DENMARK

Two Danish fish exporters in Skagen have received the first in a series of steel trawlers that will be delivered from East Germany in accordance with 1965 trade agreements. One of the exporters has ordered 12 steel side trawlers and 6 large stern trawlers. The other has contracted for 10 side trawlers. Vessels will be sold by the Danish exporters to fishermen.

Side trawlers are 110 feet long, 175 GRT, with 678-hp. turbo-supercharging motor. Their speed about 11 knots. They can be mounted with power block and purse seine, have reversible propeller, and latest electronic devices. They will be manned by a

East Germany (Contd.):

crew of 6. One vessel cost 1.3 million kroner (about US$175,000). Some vessels to be delivered later will be higher priced.

Welcomed by Fisheries Ministry

The increase in large steel vessels is welcomed by the Danish Ministry of Fisheries, which has urged modernization of the fishing fleet. Two large fishing centers in Jutland spearhead this development: Hirtshals leads with 54 such newer vessels, followed by Skagen with 49. Most of the additional vessels to be delivered from East Germany will probably be divided between those two ports. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26, 1967.)

## USSR

EXPANDS SAURY AND MACKEREL FISHING OFF JAPAN

The Soviet Union began fishing for saury and mackerel off the northeastern coast of Japan in 1963. She has been steadily expanding her operations. In 1965, she sent three 10,000-ton motherships and about 20 catcher vessels; in 1966, one 15,000-ton and two 10,000-ton motherships accompanied by about thirty 100- and 300-ton catcher vessels. In 1967, she is operating 6-7 miles offshore of Hokkaido two 14,000-gross-ton motherships accompanied by twenty-six 300-ton catcher vessels. They are purse-seining for mackerel.

Japanese Fishermen Urge Countermeasures

In view of these expanding operations, the Japanese saury and mackerel fishermen are urging the Government to develop drastic countermeasures. They demand that Japan establish a 12-mile exclusive fishing zone. They claim that excessive fishing will nullify saury and mackerel fishing regulations established in Japan to adjust domestic supply and demand and deplete the resources. However, it is understood that the Government considers it premature to establish a 12-mile fishing limit. It believes such an action would have an adverse effect on the fisheries of Japan's northern waters (Okhotsk Sea, Bering Sea, and North Pacific Ocean). ("Minato Shimbun," Nov. 11, 1967.)

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TRAWLER REPORTED OFF JAPAN'S WEST COAST

A 1,200-ton Soviet stern trawler was reported in mid-November 1967 off western Japan, about 11 nautical miles off Hagi, Yamaguchi Prefecture. This is the first time that a Soviet fishing vessel has come so close to the west coast.

The local fishermen, alarmed by the Soviet trawler's presence in an area prohibited by Japanese law to offshore trawling to protect coastal fishermen, are asking the Fisheries Agency to develop measures to cope with the Soviet operations. They fear that full-scale Soviet fishing operations would threaten the existence of the coastal fisheries in western Japan. ("Shin Suisan Shimbun," Dec. 4, 1967.)

## Spain

SHRIMP TRAWLER TO FISH OFF WESTERN CENTRAL AMERICA

A large Spanish trawler will be operating for several months off the west coast of Central America. The vessel is owned by Admiral M. Dominquez Macaya, owner of large fleets in Vigo and Cadiz, Spain. Efforts will be directed toward deep-water shrimp. The shrimp will be processed, packed in cartons, and frozen aboard ship. Incidental species also will be processed and frozen. The vessel has a freezer capacity of 250 tons. (Proyecto Regional de Desarrollo Pesquero en Centroamerica, "Boletin Informativo," Nov. 15, 1967.)

# LATIN AMERICA

## Mexico

### FISHERIES PRODUCTION IS UP

Mexican fisheries production during the first eight months of 1967 was 14.5 percent ahead of comparable figures of a year earlier. Nearly all important species showed impressive gains. Total production for Jan.-Aug. 1967 was 151,483 metric tons, compared to 132,341 tons in 1966. Among leading species were sardines, 22,432 tons (up 53 percent); shrimp, 19,566 tons (up 8 percent); anchovy, 16,296 (up 74 percent). Gains also were made for skipjack, other tuna, and red snapper.

Shrimp Exports Ahead of 1966

Shrimp exports continued to remain far ahead of 1966. During Jan.-Aug. 1967, shipments were worth US$30,664,000, or 33.6 percent above the 1966 period; 1966 was 7.4 percent ahead of 1965's poor year. Shrimp ranked fifth among all Mexican exports during the first eight months of 1967. Heaviest shrimp production normally occurs during the last 4 months of the year. Reports from the Pacific Coast indicate that the season, which opened on Sept. 1, has been good so far. As of Oct. 20, exports were up 7 percent over last year. (Regional Fisheries Attaché, U. S. Embassy, Mexico City, Nov. 19, 1967.)

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### FRENCH MAKE LARGE FISHERIES LOAN

A French loan of about US$35 million to develop Mexican fisheries, made in November 1967, will be used for exploratory fishing and to construct vessels and processing facilities. French vessels, with mixed French-Mexican crews, later to be replaced by all-Mexican crews, will conduct exploratory fishing, and prototype vessels to exploit any resources found will be built in France. More vessels will be constructed in Mexico, probably at Matzatlan, using French engines and equipment.

Three vessels were on their way from France in early November 1967, each with 2 French officers and fishermen. A 200-ton trawler will begin operating at Mazatlan; the other vessel will operate from Ensenada and from Progreso, Yucatan. Existing shore facilities will be used the first 6 months, and frozen fish will be produced for the domestic market. If experimental fishing and marketing justify them, additional vessels and processing facilities will be added. It is hoped that an export market in the U. S. and Europe will be created.

The operations will be based on those underway in Mauritania by the parent French company (Compagnie Internationale de Gestion et de Participation). The Mexicans will provide 5 percent of the financing; the remaining 95 percent will be loaned by the French for 9 years at $6\frac{1}{4}$ percent interest.

Loan A Result of Protocol

The loan follows the protocol negotiated in June 1967 and adopted by both governments. The protocol guarantees the agreement between the French company and Mexican fisheries interests. No specific sums are mentioned, nor number of vessels. The plan generally calls for French technical assistance and French vessels to fish several months to determine facilities and infrastructure needed to develop Mexican fisheries.

The Mexican delegation in June was headed by Octaviano Campos Salas, Secretary of Industry and Commerce; the French by Jean Morin, Secretary General of the Merchant Marine. Both delegations included industry and government representatives, including Jorge Echaniz, Mexican Director of Fisheries. The negotiations were preceded by a visit to Mexico by French fishing experts. They decided then to limit development plans to the Pacific coast. The Mexicans, in turn, visited Mauritania later to view operations.

The agreement does not seem universally popular. Although the operation is described as strictly private enterprise, both French and Mexican governments will supervise it. Some Mexican participating companies are government owned. Some private entrepreneurs claim they will be unable to take advantage of the opportunity because they have

Mexico (Contd.):

lost control to fishermen's co-ops. Conversely, the co-ops are reported to view the arrangement as a threat to their domination. (Last summer, Campos Salas reassured both sides that both would profit from the deal.) Also, during the period between the protocol's negotiation and approval, when it was uncertain either government would approve, Echaniz reportedly sought a similar deal with Spanish interests to provide assistance being sought from the French. Both sides have good records, however, and informed observers say the venture has a better-than-even chance of success.

The following Mexican facilities will be utilized: at Ensenada, Guillermo Mejia will use several plants of Empresa Rodriguez; at Preoreso, Alberto Solis will use his freezing plant; at Mazatlan, Antonio Cevallos will use his freezing plant, Refrigeradora Mexicana, in partnership with Tomas de Rueda of Astilleros Unidos del Pacifico, a shipyard.

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## REPORT ON MAZATLAN'S FISHING VESSEL CONSTRUCTION

The largest shipyard on Mexico's Pacific Coast, Astilleros Unidos del Pacifico, S.A., of Mazatlan, is operating at about 30 percent of capacity. Most of the output is steel fishing vessels for export. The yard had to turn to the foreign market because the domestic fishing industry virtually ceased ordering new vessels. Although very successful, the yard had difficulty showing a profit. The plant now is a government operation with the original management.

In recent years, the shipyard built and exported shrimp trawlers and purse seiners to Kuwait, Pakistan, Brazil, Chile, and Venezuela. Recent contributions to the Mexican fleet include a kelp harvester and a tuna purse seiner for Ensenada, and a shrimp trawler for Mazatlan. Completed, but unsold, are 3 purse seiners--two ordered by Chilean interests who could not pay when anchovy fishery slumped.

### Vessels in the Works

Work underway includes: Five 73-foot shrimp trawlers for a Japanese company in Surinam; two 73-foot shrimp trawlers for Venezuela (the second order, and for a second purchaser); two 67-foot shrimp trawlers for Brazil, for 2 different companies, and follow several shipments; one 67-foot shrimp trawler for Mazatlan; one 300-ton tow-boat for PEMEX--identical to 3 others being built in Veracruz and 2 under construction in Tampico.

The shipyard has built a small landing-craft-type boat as a shrimp pick-up carrier in the lagoon fishery. This shallow-draft boat can carry 5 tons at 25 knots, and is powered with an inboard-outboard.

The yard anticipates orders for 10 more vessels from Japan, and 30 trawlers per year from the Cooperative Bank.

### The Mazatlan Vessel

The vessel being built for Mazatlan is of particular interest. It is identical, except in one respect, to the sistership delivered to the National Bank for the Development of Cooperatives in October 1967. These are the first 2 large steel trawlers added to the Mexican shrimp fleet in many years and the first to have all-brine refrigeration. The fiberglass brine tanks were built by an affiliated yard. Until now, the Mexican fishery failed to follow the lead of all other shrimp fleets and so the boats are all ice refrigerated. Another innovation is that both boats are equipped with shipboard reduction plants for manufacturing fish meal from incidental or scrap fish taken while fishing for shrimp. The plants are built by Productos Marinos Industrializados, S.A., an affiliate of the Cooperative Bank. As with vessels built for export, all steel is Mexican; the winches, hoists, etc., are manufactured in Mazatlan by Rice Hermanos. The first of these two trawlers is powered by a U. S.-built engine. So were all fishing vessels previously built by Astilleros Unidos. The vessel under construction has the first Rolls Royce engine to be assembled in Mexico. The engine reportedly contains 20 percent Mexican components and 80 percent British. The new Rolls Royce assembly plant will increase Mexican components to 30 percent in 1968, and 70 percent in 5 years. If successful, this engine will constitute serious competition for the universally popular U. S. engine.

### Boatbuilding Costs High

Mexican boatbuilding costs are rather high because of higher prices for material and

Mexico (Contd.):

import taxes on engines and other equipment. The Mexican yards can compete with Japanese yards only because of lower transportation costs to the user in Surinam. It costs US$5,000 to sail a trawler from Mazatlan to Paramaribo with a Mexican crew, versus $20,000 for shipment from Japan. For the export market, the price of a completely equipped 73-foot steel trawler is $90,000. This is $5,000 less than the domestic delivery price because of a rebate on all import taxes on machinery and equipment and a 15 percent discount on domestic materials, which are granted as export incentives. Further, export credit terms are for 9 years at $6\frac{1}{2}$ percent, whereas domestic credit is for 4 years at 11 percent. The encouragement of exports results in higher prices to local fishermen, who continue to use obsolete boats.

Adjacent to Astilleros Unidos is an associated but privately owned boatyard, Kessler-Rueda, S.A. de C.V. This yard, operated and partly owned by the large yard's manager, produces fiberglass fishing boats and pleasure craft. It specializes in 26-foot canoes, most used in the lagoon fishery for shrimp, and some for shark gill-netting. They can carry $1\frac{1}{2}$ tons of shrimp or fish. Most are outboard powered, but some have small inboard diesels. Kessler-Rueda has sold 280 of these "pangas" during the past 5 years. Now it is starting to build 28-footers with $2\frac{1}{2}$-ton capacity. This plant also builds fiberglass tender boats and seine skiffs for steel seiners and trawlers, and brine tanks for the new trawlers mentioned above. It also manufactures fiberglass truck fenders for Kenilworth.

The Mazatlan shipbuilding complex is rounded out by its affiliated but separately owned machine shop and a Volvo Pentax sales and service operation. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Nov. 28, 1967.)

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## NATIONALIZATION OF FISHING INDUSTRY POSSIBLE

Following a series of recent moves, the Mexican Government-controlled National Bank for the Development of Cooperatives (Banco Nacional de Fomento Cooperativo, BANFOCO) has become the dominant force in the fishing industry. In addition to gaining control of the west coast shrimp industry, BANFOCO is entering fish meal production and fish canning. It is able to expand further if it wishes. This dominance is exemplified below.

### Shrimp

On the west coast, BANFOCO dominates production, processing, and export to the U.S. and Japan. Mexican law says shrimp may be fished only by co-op fishermen. The co-ops are controlled through BANFOCO's control of operating funds, etc. Traditionally, the Bank has controlled the inshore fishery, with co-ops owning vessels. Co-ops are now expanding their hold on the high-seas fishery. They are buying up privately owned trawlers and expanding control to where private owners complain of difficulty in making a profit.

Control of production is falling exclusively to BANFOCO. Also, it owns 9 of 19 Pacific shrimp packing plants, with 66 percent of total freezing capacity. It controls Crest Importing Company and Ocean Garden Products, Inc., which handle shrimp from all BANFOCO plants, plus 6 independent plants. This leaves only 4 small plants open to other importers.

### Fish Canning, Meal Production

In October 1967, BANFOCO bought into Empresas Rodriguez, gaining control of 7 plants in Baja California and half interest in another. Facilities include the largest fish cannery and fish meal plants in Mexico, the largest purse seine fleet (sardine, mackerel, and tuna), plus repair facilities.

### The Gulf of Mexico

On the Gulf, BANFOCO is not as dominant, but it is growing. The complex at Alvarado is boosting shrimp production and is building nineteen 85-foot, all-weather, deep-water trawlers to exploit offshore resources; 35 more vessels are being considered.

On the west coast, 30 new vessels per year are planned for an indefinite period. Also, co-ops enjoy exclusive right to harvest valuable species other than shrimp, including lobsters, abalone, and oysters. All lobsters taken in Baja California are marketed through BANFOCO. (Fisheries Attaché, U. S. Embassy, Mexico, Dec. 10, 1967.)

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Mexico (Contd.):

### FISH MEAL AND TURTLE PROCESSING PLANTS OPEN

New fish meal and turtle processing plants began operations in Mexico in November 1967. The two plants are located together in San Blas, Nayarit, on the Gulf of California. They represent an investment of US$118,000 and will provide 105 new jobs. The fish meal plant is Harinas del Pescado del Pacifico, S. A. Of the $100,000 invested in it, $66,000 will be used for machinery and equipment, $8,000 for nets, $10,000 for two large barges, and $16,000 for a fishing vessel. The plant employs 68 and can produce 4 tons of fish meal and 700 liters of oil daily. All production will be shipped to Mexico City, to a firm of the same name, to be processed further and marketed. The principal investors are Alfonso Sanchez Dalvos and Manuel Corenzo; Corenzo will serve as manager.

#### Turtle Plant

The turtle plant, which will use some facilities of the fish meal plant, employs 37 and has a capacity of 500 turtles daily. All parts of the turtles will be used--meat, oil, hides, and eggs. The plant's main backer is Frandelli, S. de R. L. Investment is $18,000: $2,000 for plant equipment, $14,800 for 5 boats, and $1,600 for 2 motor vehicles. (U. S. Consulate, Mazatlan, Dec. 7, 1967.)

## Argentina

### PROMULGATES LAW REGULATING FOREIGN FISHING

The long-awaited law controlling foreign fishing in the 200-mile territorial sea proclaimed in January 1967 was published in the "Boletin Oficial," Nov. 24, 1967. It followed close upon the October 1967 fisheries promotion law that provided, among other things, that fish within 12 miles be reserved for Argentine fishermen.

The new law, Argentine Decree No. 8802, provides: (1) Foreign vessels now fishing must register within 60 days. (2) Each foreign vessel must buy a license and a permit. The license fee is US$500, the permit US$10 per net registered ton. The rates are double for factory and freezerships. The license is good for a year, the permit for 120 days. (3) An agent legally accredited and responsible for the conduct of a vessel must be present in Argentina. (4) Conservation regulations issued by Argentina must be observed. (5) Sale in Argentina of foreign-caught fish is prohibited, except by special permit. (6) Vessels must report positions each day, plus dates of entering and leaving zone of Argentine jurisdiction. (7) Notice of transshipments of fish must be given to Argentine authorities, offering an opportunity to inspect; items and quantities transshipped must be recorded and transmitted to the Government. (8) The vessels must comply with provisions of the Convention on Safety of Life at Sea. (9) Vessels with valid permits and licenses may buy supplies, fuel, etc., at Argentine ports and may employ Argentine crewmen. (10) Fines for violations shall vary between US$5,000 and US$100,000, to be determined by the maritime authorities. In certain instances, gear may be seized and vessels detained. (U. S. Embassy, Buenos Aires, Dec. 13, 1967.)

Note: The U. S. and several other nations have officially protested the Argentine 200-mile claim. An unofficial translation of the law is available from BCF's Branch of Foreign Fisheries.

## Chile

### FISH MEAL PRODUCTION DECLINES

The Chilean fish-meal industry will show a decrease in production and exports of fish meal, fish oil, and sales in 1967. The reasons: (1) total fish catch in northern Chilean waters will be lower (present estimate, 700,000 metric tons of anchoveta) than in 1966 (1,070,719 tons), and (2) average export price per ton, f.o.b. Chilean ports, has dropped considerably ($115 a metric ton) from 1966 ($160 a ton). Present-day levels are running at around $100 a ton f.o.b.

#### Financial Difficulties

Overexpansion in the fish-meal industry during 1964 and 1965 is now resulting in numerous bankruptcies and other financial difficulties. This situation resulted in government sponsored reorganization of the industry with a series of mergers, shut downs, and liquidations.

Chile (Contd.):

The current make-up of the industry is:

| Zone | 1966 Plants | 1967 Plants | 1966 Tot. Plant Cap. | 1967 Tot. Plant Cap. |
|---|---|---|---|---|
| | . . . (No.) . . . | | . . . (Tons/Hr.) . . . | |
| Arica to Taltal | 38 | 17 | 1,320 | 690 |

The Anchoveta Vessels

In December 1966, anchoveta vessels registered in northern Chile (omitting tuna vessels and small sardine boats) were reliably estimated at 224, with a total hold capacity of 30,009 tons. In November 1967, comparable figures are 120 vessels, with a total hold capacity of 17,185 tons. The latter two figures are based on vessels believed capable of fishing. (U. S. Embassy, Santiago, Nov. 17, 1967.)

## Honduras

REPORT ON FISHING INDUSTRY

The only truly developed fishery in Honduras is the shrimp industry on the Caribbean Coast. Four freezing plants and their trawler fleets are the fishery. Practically all production is exported to the U. S. The shrimp plants also pack frozen lobsters for export.

The two largest and most modern plants are located at Guanaja, a small town on a coral key close to Guanaja Island. The inhabitants of Guanaja, like those of the other Bay Islands, speak English. They consider themselves Bay Islanders rather than Hondurans. The men are excellent watermen. Many serve as crewmen on local shrimp trawlers and on U. S.-based trawlers that fish offshore. Others serve the merchant marines of many nations.

Until the two shrimp plants were built, the money sent home by the seamen was Guanaja's main source of income. The new plants have absorbed all available labor on the island; additional workers have been brought over from the mainland. The local people call their home Bonacca, the English rendition of Guanaja.

The Two Plants

The larger plant is Industria Pesquera Hondureña, owned and operated by a Spaniard named Daniel de Solabarrieta. He also owns and operates sardine and fruit canneries in Mexico. The plant is improved and expanded constantly and rates with the best in Latin America. It is housed in a modern concrete plant on the key's shore, adjacent to a marine terminal for petroleum products. It was started about 6 years ago and was intended originally to freeze lobster. Two years ago, it was realized the lobster resource is limited, and that shrimp would prove more profitable. Since then, the facilities have been greatly expanded.

Like other successful operations in isolated locations, the Guanaja plant is completely self contained: its own electric power plant, ice making machinery, freezers, cold storage, net loft, spare parts depot, etc.

The other Guanaja plant is Caribbean Producers, located on a tiny key close to the village. It is a joint operation of Adam Smith and Alberti Seafoods of the U. S. and "Kirk" Kirkconnell of Guanaja. Somewhat smaller, it is equally modern and well equipped. It also is self contained. The parent company operates freezer ships to transport production to the U. S. Most of the pack is individually quick frozen peeled and deveined.

The Fleet

The fleet serving Industria Pesquera Hondureña consists of 25 trawlers. Eleven of these are U. S. flag vessels owned by Sam Tringali of Florida. These are all modern trawlers with standardized equipment to facilitate maintenance. As is usual with a distant-based fleet, the owner or a top representative is on hand to supervise. The other 14 trawlers are old and new boats, flying the flags of Honduras, the U.S., and Panama. Some are company boats. The plant owner plans to expand the fleet to 50 trawlers. He has 7 new steel vessels under construction in Veracruz, Mexico; the remainder will be built locally or be brought in from the U. S. (U. S. Embassy, Mexico, D.F.)

# ASIA

## Japan

### CANNED SALMON AND CRAB EXPORTS HIT BY POUND DEVALUATION

Devaluation of the British pound is expected to affect adversely Japanese canned salmon and crab exports to the sterling areas. Particularly hard hit will be exports of canned pink salmon and canned tanner crab to Great Britain, Australia, and New Zealand. About 58 percent of the 1967 canned pink salmon production already has been exported (over 40 percent was purchased by Great Britain). But the sale of the remaining 42 percent is expected to decline sharply as a result of devaluation. Exports of the 1967 canned red salmon production will present no problem because 90 percent of the pack already has been contracted for shipment to Great Britain at the previous exchange rate. Sales of canned tanner crab will be affected seriously since Great Britain is the principal buyer.

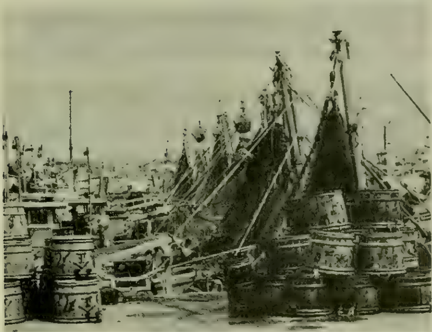

Fig. 1 - Part of Crab Fleet at Choshi (Boso Peninsula near Tokyo). (Photo: Edelsberg)

Fig. 2 - A large catch of crabs on the deck of a Japanese crab factoryship in the North Pacific.

Fig. 3 - Removing shell from processed crab meat aboard a Japanese crab factoryship.

Study Prices and Sales System

In view of these adverse effects, the Japan Canned Salmon and Crab Sales Company decided on November 20 to suspend temporarily all export sales, and to examine the need for revising the present price structure and sales system. Since Britain's aim in devaluing the pound is to expand exports and restrict imports, the company feels it is logical and essential that Japan seek to develop export markets in the dollar areas. ("Suisancho Nippo," Nov. 21, 1967.)

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### REVIEW OF HAKE FISHING OFF U. S. PACIFIC NORTHWEST

There are 3 Japanese fleets licensed for experimental hake fishing in the eastern Pacific. One of them is the "Koyo Maru No. 2" (3,456 gross tons) factoryship fleet, which began fishing off the U. S. Pacific Northwest in late September 1967. Stormy weather ended fishing on October 25, cutting short by about 2 weeks the trip originally planned.

The second fleet--8 trawlers led by the factoryship "Kashima Maru" (7,163 gross tons)--is presently fishing off Washington.

Japan (Contd.):

The third fleet is expected to begin fishing around March or April 1968.

Test fishing by the first 2 fleets has revealed: (1) the hake fishing ground is narrow in width and extends from north to south; (2) the catch fluctuates widely; (3) the sea bottom in areas of hake concentration is rugged, causing severe gear damage; and (4) in October-November, the ocean often becomes very rough, hampering fishing.

Not Very Productive in Fall and Winter

They have found that the fishery off the U. S. Pacific Northwest during the fall and winter season was not very productive. This is because the hake migrate southward from the area off Vancouver Island to Baja California during September-November. The best fishing season would be the spring and summer months, when the hake begin migrating northward, and when weather, ocean, and sea bottom conditions are more favorable.

Japanese firms felt that the operation of 3 fleets would not adversely affect the resource. ("Suisan Tsuhin," Nov. 14, 1967.)

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CATCH RISES FOR GULF OF ALASKA MOTHERSHIP TRAWL FLEET

Ten of the 11 Japanese mothership-type trawl fleets licensed to fish in the Gulf of Alaska in 1967 were operating there at the end of Oct. 1967. An 11th was scheduled to join them. It was the first time in 1967 that all 11 fleets were there.

Bottomfish Catch as of Oct. 22, 1967

| | 1967 | 1966 |
|---|---|---|
| | . . . . (Metric Tons) . . . | |
| Flatfish . . . . . . . . . . . . | 1,000 | 400 |
| Cod . . . . . . . . . . . . | 2,000 | 600 |
| Alaska pollock . . . . . . . . | 6,000 | 4,500 |
| Sablefish. . . . . . . . . . . . | 5,000 | 3,000 |
| Pacific ocean perch . . . . . . | 73,000 | 50,000 |
| Shrimp . . . . . . . . . . . . | 1,000 | 500 |
| Others . . . . . . . . . . . . | 5,000 | 1,000 |
| Total . . . . . . . . . . . | 93,000 | 60,000 |

A Japanese trawler fishing bottomfish for the mothership in Bering Sea.

Plan Based on FAO Report

Japan's plan to operate 3 fleets in 1967 was based on an FAO report on resource investigations. These indicated the estimated abundance of Pacific hake to be around 1.5-2 million tons, sufficient to support an annual harvest of 200,000-300,000 tons. The

Catches as of Oct. 22 were 93,000 metric tons of bottomfish, up 55 percent above 1966 landings; they consisted of over 75 percent ocean perch, indicating that species' abundance in the Gulf. In contrast, the 1967 Bering Sea bottomfish catch consisted of 75 percent Alaska pollock. ("Suisan Tsushin," Oct. 31, 1967.)

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Japan (Contd.):

## LICENSES WHALING OFF PERU AND CHILE

The Japanese Fisheries Agency, on October 5, 1967, licensed Kinkai Hogei Whaling Co. to conduct exploratory whaling off Peru until April 25, 1968. The firm's fleet consists of 3 catcher vessels: "Hassho Maru," 623 gross tons, "Seki Maru No. 11," 473 gross tons, and "Shichisho Maru," 623 gross tons, and one scouting vessel, "Shoyu Maru," 198 gross tons.

The fleet departed Japan for Paita, Peru, on Nov. 4. Its catch target is 150 whalebone whales and 1,200 sperm whales. The catches will be sold to a Peruvian firm. The processed products will be bought back for export to Japan.

2nd Fleet Off Chile

On October 23, 1967, the Agency licensed another whaling firm, Nitto Hogei, to hunt whales off Chile until April 30, 1968. The firm plans to operate 5 whaling vessels from a Chilean base. The catch target is 200 whalebone whales (converted to blue-whale units) and 348 sperm whales. The catches will be sold also to a local firm and the meat repurchased for shipment to Japan. ("Shin Suisan Shimbun," Nov. 13, 1967.)

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## APPROVES TRAWL EXPLORATION OFF CHILE

The Nitto Hogei Whaling Co. has obtained tentative approval from the Japanese Fisheries Agency to conduct exploratory trawl fishing off Chile for hake and shrimp. Approval reportedly was granted on condition that Nitto Hogei, now negotiating a joint whaling and trawl fishing venture with Chilean interests, establish the joint company by April 1968. The trawlers could then operate under Chile's flag and so avoid complications that could arise from the latter's claim to 200-mile territorial waters, and other problems.

Nitto Hogei has chartered two 300-gross-ton trawlers for exploratory operations east of $80^{\circ}$ W. longitude. Also, it has chartered the freezership "Chichibu Maru" (7,477 gross tons) to serve as a floating cold storage. ("Shin Suisan Shimbun Sokuho," Nov. 4, 1967.)

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## YAIZU LANDINGS DOWN BUT VALUE UP

October 1967 landings at the leading Japanese tuna port of Yaizu totaled 10,577 metric tons worth about US$5.48 million, according to the Yaizu Fishery Cooperative Association.

Landings and Average Exvessel Prices

| Product | Quantity | | | Average Price | | |
|---|---|---|---|---|---|---|
| | 1967 | | 1966 | 1967 | | 1966 |
| | Oct. | Sept. | Oct. | Oct. | Sept. | Oct. |
| | . . . (Metric Tons) . . . | | | . (US$/Short Ton) . | | |
| Tuna: | | | | | | |
| Bluefin1/ . . | 4,873 | 3,674 | 4,056 | 718 | 720 | 584 |
| Albacore . . | 630 | 691 | 731 | 474 | 464 | 464 |
| Skipjack . . | 2,792 | 2,534 | 4,500 | 287 | 275 | 199 |
| Mackerel . . . | 1,467 | 989 | 771 | 93 | 83 | 90 |
| Others . . . . . | 815 | 811 | 876 | - | - | - |
| Total . . | 10,577 | 8,699 | 10,934 | - | - | - |

1/Includes yellowfin and big-eyed tuna.

Compared with October 1966, landings were down 357 tons but up $1.18 million. The decline was due primarily to poor skipjack fishing. ("Kanzume Nippo," Nov. 7, 1967.)

* * *

## JAPANESE TO FISH ARCTIC SALMON AGAIN IN 1968

The Japanese Fisheries Agency reportedly intends to again permit exploratory salmon fishing in the Arctic region in 1968. During the recent annual meeting of the International North Pacific Fisheries Commission convened in Tokyo, a controversy developed over Japanese polar salmon fishing but the Agency's view is that the operation does not violate the Tripartite Fisheries Treaty. The polar operation was first conducted in 1966 by Hoko Suisan Fishing Company with the "Dairin Maru No. 8" (200 gross tons) and in 1967 with the larger "Dairin Maru No. 10" (300 gross tons) but the results in both expeditions were disappointing, with about 80 metric tons of salmon (mostly chums) caught in the first trip and about 86 tons in the second trip. ("Shin Suisan Shimbun," November 20, 1967.)

* * *

Japan (Contd.):

RAISE ASSESSMENTS
ON TUNA EXPORTS

The Japan Frozen Tuna Producers Association, which conducts its business with funds obtained from assessments levied on tuna exports, is facing increasing difficulties in managing its finances owing to the sharply reduced revenue caused by depressed tuna exports this year. The Association's data show that fresh and frozen tuna exported during March-September 1967 totaled 64,956 short tons, over 50 percent less than the organization's projection of 145,000 tons of exports for that period. Therefore, to increase its revenue so as to provide uninterrupted service, the Association has raised the assessments on tuna exports as follows (per metric ton): frozen tuna (other than skipjack) in round, dressed, or gilled & gutted--24 cents (up 5 cents), fillets--37 cents (up $7\frac{1}{2}$ cents), loins and discs--49 cents (up $2\frac{1}{2}$ cents); frozen skipjack in round, dressed, or gilled & gutted--12 cents (up $2\frac{1}{2}$ cents), loins and discs--25 cents (up 5 cents). ("Nihon Suisan Shimbun," Nov. 10, 1967.)

日本

## Indonesia

S. KOREANS PLAN EXPLORATORY
SHRIMP FISHING OFF INDONESIA

The South Korean Sinhung (Shinko in Japanese) Cold Storage Co. plans exploratory shrimp fishing in Indonesia off Java Island with 10 shrimp trawlers. The vessels (120 gross tons) were built in Japan with part of the US$90 million non-Government credit provided by Japan under the economic cooperation agreement with South Korea.

The fleet was scheduled to depart Pusan around the end of November 1967 for its base at Jakarta. Catches reportedly will be sold to Japan. ("Suisan Keizai Shimbun," Nov. 15, 1967.)

## India

SHRIMP AND SHRIMP PRODUCTS
EXPORTS INCREASED

The latest available figures on Indian shrimp and shrimp products exports--from "Indian Seafoods," The Marine Products Export Promotion Council, Ernakulam, vol. IV, no. 4, 1967--are:

| Product | 1966 | | 1965 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | Metric Tons | US$ 1,000 | Metric Tons | US$ 1,000 |
| Frozen . . . . | 8,783.5 | 11,683.0 | 7,028.1 | 5,450.0 |
| Canned . . . | 1,523.3 | 2,454.8 | 1,148.0 | 1,250.7 |
| Powder . . . | 81.7 | 7.3 | 104.0 | 8.8 |
| Meal . . . . . | - | - | 2.0 | 0.2 |
| Bits . . . . . | 3.0 | 0.7 | - | - |
| Pickles . . . . | 1.8 | 1.6 | 0.9 | 0.4 |

* * *

PROJECTS ARE UNDERWAY
TO DEVELOP FISHERIES

Projects are underway, or are in the planning stages, to develop several aspects of India's fisheries. One is the construction of 8 harbors with a loan from the World Bank and technical assistance from the USSR.

US$5 to $6 million already has been spent in Kerala to develop deep-sea fishing. Over 800 mechanized vessels are to be built in government-owned shipyards in the coming years; in recent years, 785 vessels were built. Refrigeration equipment soon will be installed on some vessels.

Kerala Looks to Deep-Sea Fishing

The Kerala State Government is preparing a master plan to exploit deep-sea fishing. At the present time, only 10 percent of the available resource is being utilized. Other plans include the organization of fishermen's cooperatives and the granting of Federal subsidies to fishermen. ("Seafood Trade Journal" 1967).

## South Korea

BUYS NORWEGIAN FACTORYSHIP

The Norwegian factoryship "Bataan" has been sold to a South Korean firm. It was delivered to the new owners Nov. 28, 1967, and renamed "Shin Hung." The vessel has a complete 2-line canning plant (cap. 10 tons an hour); reduction plant (25 tons a day); and freezer handling 100 tons a day. Cold-storage rooms have 2,900-ton capacity. Storage is available for 400 tons of fish meal, 200 tons of fish oil, and 2,500 tons of canned fish. The Shin Hung has a 32-man crew and up to 400 factory workers. (U. S. Embassy, Oslo, Dec. 1, 1967.)

## Taiwan

PLANS TUNA SALES COMPANY
IN AMERICAN SAMOA

Taiwan, which operates over 80 tuna vessels out of American Samoa, reported plans to establish on Samoa a sales company. It would be financed jointly by the Taiwanese Government and the fishing industry.

At present, tuna landings of the Samoa-based Taiwanese fleet are sold through the Japanese Taiyo Fishing Co. and the Formosan Marine Products. The proposed company would take over sales as well as supply procurement for the fleet. ("Suisancho Nippo," Nov. 4, 1967.)

## Taiwanese and S. Korean Tuna Exports Through Japanese Traders Increasing

Formosan and South Korean tuna exports transacted through Japanese trading firms are increasing yearly. They totaled 15,000 short tons in 1966. By Oct. 31, 1967, they had reached close to 20,000 tons. By species the 1967 exports were: albacore 11,671 tons, yellowfin 6,103 tons, and big-eyed 2,040 tons, totaling 19,814 tons. Most of these exports went to the U. S. Albacore export handled by Japanese firms during this period compares with 20,343 short tons of Japanese albacore validated for direct export to the U. S. during April-September 1967.

Principal Japanese sellers for Taiwanese and S. Korean tuna producers are the trading firms Nichimen, Mitsui Bussan, Toshoku, and C. Itoh & Co., and the fishery firms Taiyo Gyogyo and Kaigai Gyogyo. ("Suisancho Nippo," Nov. 6, 1967.)

## Indian Ocean Tuna Fishing Drops

Tuna fishing in the Indian Ocean was good until late August 1967, then suddenly began declining in September. The albacore catch, which averaged 3-4 metric tons a vessel a day off Mauritius Island and Madagascar until August, declined sharply in October-November. Therefore, tuna vessels moved northward in the western Indian Ocean towards Seychelles Islands, where they were fishing in mid-November for yellowfin. Even in that area, catches were averaging under 2 tons a day.

155 Vessels in W. Indian Ocean

Tuna vessels operating in the western Indian Ocean numbered around 155 vessels: 60 Japanese, 80 Taiwanese, and 15 South Korean. Tuna fishing in the Indian Ocean, especially by Taiwan, is increasing steadily, although the Japanese fleet, which numbered 80-100 vessels a few years ago, is dwindling gradually. Some Japanese believe Indian Ocean tuna are being overfished. ("Suisan Tsushin," Nov. 7, 1967.)

# AFRICA

## South-West Africa

### TIGHTENS FISHERY ENFORCEMENT

The South-West African Administration will buy 2 patrol vessels and an airplane to strengthen its protection of the Territory's fishing industry. This increased enforcement reportedly will be used primarily against South African factoryships and fishing craft that stray into South-West African fishing grounds. (U. S. Consulate, Cape Town, Nov. 17, 1967.)

## Nigeria

### NEW SHRIMP VENTURE

The West African Development Corporation Ltd. (WADC) is planning to begin shrimp fishing off the Nigerian coast in the near future. Formed in January 1964, WADC has been inactive until now. It owns 2 fishing trawlers, now in Abidjan, which have been adapted for shrimp fishing. It has arranged to lease 10 trawlers and a mothership from Norway and Denmark. Berthing space has also been secured at the Ijora landing in Lagos.

The company used its 2 trawlers to survey the Nigerian coastal waters for shrimp beds in 1964. The managing director estimates that in the initial stages of the operation--with 6 boats at sea at one time--the catch could reach an annual rate of 150 metric tons. Shrimp fishing will begin as soon as arrangements are made with U. S. importers. (U. S. Embassy, Lagos, Nov. 19, 1967.)

* * *

### NORTHERN NIGERIA PRODUCES OVER HALF NATION'S TOTAL CATCH

An estimated 30,000 tons of fish annually, more than half Nigeria's total fish production, comes from the northern part of the country. Much of the North's output is concentrated in Lake Chad, an international lake at the northeast corner of Nigeria. The lake extends into Chad, the Cameroons, and the Niger Republic.

Many fishermen also work the country's 2 large rivers, the Benue and the Niger. Sometime in 1968, the completion of the Niger Dam will create a lake--and more fishing.

Northern Nigerians do not eat much fish. Most of the catch is transported south to areas where fish is an important part of the diet.

#### Plans to Aid Fishing

There are regional, federal government, and international programs in the North to upgrade the fishing industry and to increase production, especially on Lake Chad. The emphasis is on improved methods and more efficient means of processing and marketing.

The potential for increasing fish catch on Lake Chad seems considerable, and fishing in the other 3 lake-shore nations is only at the beginning stages. Research relating to a regional fisheries project covering the 4 lake-shore countries has begun under the sponsorship of the UN and the Chad Basin Commission. (U. S. Consulate General, Kaduna.)

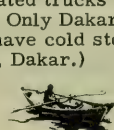
## Senegal

### CANOE-TYPE BOATS CATCH 80-85% OF FISH

The fishing industry is important to Senegal's economy--though the chances for growth are not favorable at the present time. The industry contributes about 3 percent of the gross domestic product, 10-12 percent of export cannings, and employs an estimated 25,000 people. Sardinella make up 20-40 percent of the total catch. Almost all of Senegal's processed fish is exported to France.

Fishing is largely "traditional." About 80-85 percent of all fish landed in Senegal are caught by small, canoe-type boats ("pirogues") operating close to shore. One-third of the pirogues are powered by outboard motors that may be bought without paying domestic customs duties. The boats carry 2-6 fishermen and are equipped with handlines and/or small nets.

Most of the catch is sold fresh in local markets without industrial processing. There are no refrigerated trucks to carry fresh fish to the interior. Only Dakar and a few large interior cities have cold storage facilities. (U. S. Embassy, Dakar.)



# INDEX



Index continued page 67.

## INDEX (CONTINUED)



## CAVIAR CROWN

1 jar (4 ounces) salmon caviar

1 jar (3-1/2 ounces) whitefish caviar

2 packages ( 8 ounces each) cream cheese, softened

2 tablespoons lemon juice

2 tablespoons chopped green onion

1 teaspoon Worcestershire sauce

Parsley

Assorted party breads or melba toast

Drain caviars. Cream the cheese and seasonings. Place cheese mixture in center of a serving plate and shape in a circle about 7 inches in diameter and 1 inch thick, similar to a layer cake. Cover a 4-inch circle in the center with salmon caviar. Cover the remaining $1\frac{1}{2}$ inches on top and the sides with whitefish caviar. Place small sprigs of parsley around edge of salmon caviar. (A ring of overlapping slices of tiny stuffed olives or a ribbon of cream cheese put through a pastry tube may be substituted for the parsley.) Garnish base of cheese mixture with parsley. Serve with party breads or melba toast. Makes approximately 2 cups of spread.

Note: For large parties, fix several small crowns using $\frac{1}{2}$ recipe for each one. Divide cheese mixture in half and make two cheese circles about $3\frac{1}{2}$ inches in diameter and 1 inch thick. Cover a 2-inch circle in center of each with salmon caviar and remaining outside edges with whitefish caviar. Proceed as directed above.

This idea for entertaining is from a 22-page, full-color booklet, Nautical Notions for Nibbling, released by the United States Department of the Interior's Bureau of Commercial Fisheries. It is available for 45 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

☆ U.S. GOVERNMENT PRINTING OFFICE 1968: 301-143/7

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR

Stewart L. Udall, *Secretary*

David S. Black, *Under Secretary*

Stanley A. Cain, *Assistant Secretary for Fish and Wildlife and Parks*

FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES, H. E. Crowther, *Director*

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Contact us and give your products the foreign exposure that makes sales.

# OMMERCIAL FISHERIES Review

VOL. 30, NO. 2

FEBRUARY 1968

COVER: Fishermen tossing net over the side of a BCF research vessel.
(Photo: Robert K. Brigham)

# COMMERCIAL FISHERIES
## Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.


Fishermen's Memorial
Gloucester, Mass.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)
and Mary Andrews

The Bureau of Commercial Fisheries and The Bureau of Sport Fisheries and Wildlife make up The Fish and Wildlife Service of The United States Department of the Interior.

Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209.

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# CONTENTS

Nantucket fishing boats. (Photo: Robert K. Brigham)

# 1968 PRODUCTION OUTLOOK IS NOT ENCOURAGING

The 1968 production outlook for the U. S. fishing industry is not encouraging. Groundfish abundance off New England is down--including haddock, cod, pollock, and flounder. Shrimp production, primarily in the Gulf of Mexico, is expected to be less than in 1967. Salmon production should improve over 1967, a particularly poor year, but may not reach 1965 and 1966 levels. The catches of Northern lobsters and sea scallops are not likely to increase much, if at all. Little change is expected in catches of crabs and oysters. Imports will continue to be the major source of edible fishery products in 1968--providing more than half the available supplies.

Prices will work up slowly during 1968. During the first quarter, retail prices for canned tuna and frozen shrimp are expected to be relatively favorable for consumers. Little increase is expected for these two items this year.

# THE 1967 STORY

Latest data, as of Jan. 22, 1968, indicate that supplies of edible fishery products in 1967 dropped about 3 percent--70 million pounds--below 1966. Imports did not increase as anticipated, although domestic production did drop, as expected. Besides the small run of salmon, there were disappointing catches of Northern lobsters, sea scallops, haddock, ocean perch, Atlantic coast flounders, and whiting; all contributed to the reduced domestic production.

Except for canned salmon, stocks at year's end were not unusually low, but they reflected the reduced supplies of many popular items. Cold-storage holdings of fillets of cod and haddock were below those of a year ago. Also lower were holdings of halibut, swordfish, whiting, spiny lobster tails, oysters, crabs and crab meat, scallops, and cured fish. On the plus side, frozen stocks of shrimp were sharply above those of a year ago. (BCF Branch of Current Economic Analysis.)

# UNITED STATES

## Friday Meat Hurts New England Fishermen

During the 9 months following the decree of the Roman Catholic Bishops of the United States abolishing meatless Fridays, the estimated average prices of New England fish were 12.5 percent lower than normal "after considering all other factors that affect fish demand." The loss to the New England industry was estimated at about $3 million. "Although the short-run impact of the Church decrees has resulted in economic loss to the fishing industry, the long-run demand for fish remains uncertain."

This is reported by economist Frederick W. Bell in the December 1967 issue of "The New England Business Review" of the Federal Reserve Bank of Boston, Mass.

The fishing industry's problems were aggravated by smaller catches in early 1967, which depressed already-sagging revenues. To make matters worse, meat and poultry--chief competitors of fish--were plentiful in 1967 and their prices were dropping.

Two Church Actions

In February 1966, Pope Paul VI decreed that Catholics no longer had to abstain from eating meat during Lenten weekdays, except on Fridays. (Lent is the 40 weekdays from Ash Wednesday to Easter.) Also, he empowered national conferences of bishops to end the ban on eating meat on Fridays during the rest of the year. In the United States, in November, the bishops announced that the ban would be lifted in December.

Short-Run Effect

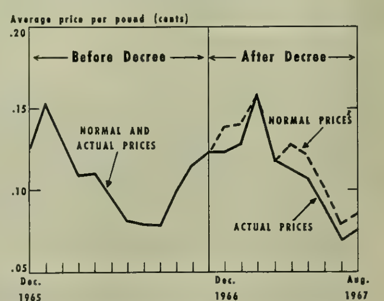
Bell states that the U. S. Northeast is an excellent area in which to assess the impact of the bishops' decree on fish consumption: much fresh fish is landed and distributed widely, and 45.1 percent of the population is Catholic, over twice the percent in any other region, according to the U. S. Department of Commerce.

To study the problem, 7 species of fish distributed to a large Catholic population were selected. These comprise about 72 percent by quantity and 79 percent by value of the catch landed in New England ports--excluding lobster, clams, oysters, and miscellaneous marine products. "It is unlikely that the latter are heavily tied to meatless Fridays." The species considered were:

| Species | Principal Ports |
|---|---|
| Sea Scallops | New Bedford |
| Yellowtail flounder | New Bedford-Pt. Judith-Provincetown |
| Scrod (small haddock) | New Bedford-Boston-Gloucester |
| Large haddock | New Bedford-Boston-Gloucester |
| Cod | New Bedford-Boston-Gloucester |
| Ocean perch | Gloucester-Portland-Rockland |
| Whiting | Gloucester-Province-town-Portland |

Bell's study focused on 2 time periods: the 10 years before the decree, January 1957 to November 1966, and the period after the decree, December 1966 to August 1967. February and March were excluded because Catholics must not eat meat on Lenten Fridays.

ACTUAL AND NORMAL LANDING PRICES
FOR SEVEN NEW ENGLAND FISH AND SHELLFISH SPECIES
BEFORE AND AFTER THE ABOLITION OF MEATLESS FRIDAYS*




*AVERAGE PRICE FOR THE COMBINED SPECIES OF SCALLOPS, YELLOWTAIL FLOUNDER, SCROD, HADDOCK, COD, OCEAN PERCH AND WHITING.

Table 1 - Impact of the Abolition of Meatless Friday on New England Landing Prices for Seven Fish and Shellfish Species (December 1966-August 1967)1/

| Species | Actual Price Per Pound3/ | Actual Revenue | Normal Price Per Pound4/ | Normal Revenue5/ | Decline in Revenue6/ | Percent Change in Revenue and Price |
|---|---|---|---|---|---|---|
| | ¢ | $1,000 | ¢ | $1,000 | $1,000 | % |
| Sea scallops . . . | 66.1 | 2,943 | 79.3 | 3,546 | 603 | -17 |
| Flounder2/ . . . | 11.7 | 2,989 | 13.6 | 3,476 | 487 | -14 |
| Scrod . . . . . . | 11.3 | 4,228 | 11.5 | 4,314 | 86 | - 2 |
| Haddock . . . . | 13.6 | 2,512 | 17.4 | 3,180 | 668 | -21 |
| Cod . . . . . . . | 8.9 | 1,949 | 9.9 | 2,166 | 217 | -10 |
| Perch . . . . . . | 4.1 | 1,859 | 4.4 | 2,020 | 161 | - 8 |
| Whiting . . . . . | 3.1 | 1,251 | 3.8 | 1,563 | 312 | -20 |
| Total (all species) | 9.2 | 17,731 | 10.6 | 20,265 | 2,534 | -12.5 |

1/Excludes February and March.
2/Yellowtail flounder.
3/Weighted average (weighted by quantity landed).
4/Normal price is determined by all demand factors which affect price, except bishops' decree.
5/Normal price multiplied by actual landings.
6/Normal revenue minus actual revenue.
Source: Federal Reserve Bank of Boston and BCF.

He reports: "After statistically controlling all demand factors that affect landing prices, the study showed that in the period after the bishops' decree prices were lower than normal for all seven species considered. Normal prices are defined as those resulting from all other demand factors except the bishops' decree."

His analysis discloses that landed prices of fish in New England averaged 12.5 percent lower than normal after the decree. The drop in monthly prices below normal ranged from about 21 percent for haddock to 2 percent for scrod.

For the 7 species, the fishing fleet lost about $2.5 million from December 1966 to August 1967 (excluding February and March). Using the average price decline of the 7 to estimate the approximate price decline for the remaining New England species (excluding lobsters, clams, oysters, and others) indicates that the total loss may be over $3 million for December-August. The economic loss is distributed among many communities; New Bedford is hardest hit.

Bell says his findings are consistent with those of other surveys. A recent one of suburban families in Chicago, Ill., found 35 percent eating less fish than before the decree. The Gallup poll in January 1967 revealed that 54 percent of the 45 million U. S. Catholics planned to eat meat on Friday.

As far as the effect of the Pope's decree permitting Catholics to eat meat during Lenten weekdays, except Fridays, Bell believes more post-decree Lenten months must be studied before "the exact impact may be assessed."

Other Problems for Industry

From December 1966 to August 1967 landings of the 7 species dropped 23 percent under the figure for the year-earlier period. "Holding all other demand factors constant, the decline in landings produced a 16 percent decline in industry revenue or approximately $4.4 million." Bell attributes the decline to rough weather in early 1967 and seasonal scarcity of fish in the Northwest Atlantic.

Table 2 - Change in Landings for the New England Fishing Industry (Period Following the Abolition of the Meatless Friday Compared with the Prior Period)

| Species | Landings 12/65-8/66 | Landings 12/66-8/67 1/ | Percent Change |
|---|---|---|---|
| | . . . . (1,000 Lbs.) . . . . | | % |
| Sea scallops . . . . | 9,104 | 5,167 | -43 |
| Yellowtail flounder | 50,041 | 34,979 | -30 |
| Scrod. . . . . . . . | 60,760 | 47,642 | -22 |
| Haddock . . . . . . | 30,517 | 22,206 | -27 |
| Cod . . . . . . . . | 20,896 | 23,959 | +15 |
| Ocean perch . . . . | 62,326 | 53,791 | -14 |
| Whiting . . . . . . | 57,092 | 37,903 | -34 |
| Total (all species) | 290,736 | 225,647 | -22 |

1/Includes February and March.
Source: BCF.

The monthly index of meat and poultry prices averaged 4 percent below 1966's--resulting in a drop in fish prices of about 5 percent. This produced a loss of $1.5 million in December 1966-August 1967 for the 7 species. "Although the decline in landings and the fall in meat and poultry prices may be

just temporary, they have served to aggravate the impact of the bishops' decree."

Long-Run Effects are Uncertain

Bell believes it is too early to assess the long-run reactions of Catholics to the church changes--"perhaps, 18 to 24 months will be necessary." To do this, answers would have to be obtained for several important questions:

1. Did Catholics eat more fish than non-Catholics before the decree? Non-Catholic demand for fish may be considered "normal"--"without artificial inducements." If Catholics ate more fish than other groups before the decree, this extra consumption might have vanished after the decree and produced Bell's findings.

2. Catholics may have eaten the same amount of fish as non-Catholics--but reduced consumption for a short period with their new freedom. If this is what happened, "it might imply long-run optimism for the industry since Catholics may, after a time, return to 'normal' fish eating habits of non-Catholics."

3. There is a possibility, less pleasant for the industry, that "both Catholic and non-Catholic demand was artificially created by the institution of meatless Fridays." Many restaurants and institutions served fish on Friday and that may have induced non-Catholics to eat more fish than usual.

## 1967 New England Landings Dropped Sharply

New England food fish landings in 1967 were 354 million pounds--down 78 million pounds from the 432 million of 1966. Industrial fish landings were 73.7 million pounds, compared to 77.2 in 1966.

Landings at Boston Fish Pier were 77 million pounds; in 1966, they were 89 million. The big drop was in scrod haddock--33 million, compared with 48 million in 1966. Average exvessel price for all fish landed in Boston--12.11 cents a pound--was only slightly above 1966.

## Washington State Water Standards Approved

Secretary of the Interior Stewart L. Udall has approved the water quality standards adopted by the State of Washington to protect and improve the quality of its hundreds of miles of interstate and coastal waters. The standards provide that existing water quality will be retained or improved.

Under the Water Quality Act of 1965, the States were given the opportunity to establish standards to enhance the quality of their interstate and coastal waters, subject to approval by the Interior Secretary.

Washington joined 10 other States whose standards have been approved in whole or in part.

The Washington standards provide for multiple use of interstate and coastal waters, including swimming, boating, oyster harvesting, and salmon migration. All these waters will be made suitable for swimming, except the 3 industrial harbor areas of Seattle, Everett, and Bellingham. The standards include a time schedule for building a secondary-treatment facility for all domestic, commercial, and industrial wastes discharged to fresh water streams by 1972.

Thermal Effects

Secretary Udall noted that a recently started two-year study of the effects of raising water temperature by power plants and other operations in the Columbia River Basin should help to resolve the differing limitations imposed by Washington and neighboring Oregon on the allowable change in water temperature. The study is being made by officials of Washington and Oregon, Interior's Federal Water Pollution Control Administration, and the Atomic Energy Commission. Temperature changes in streams, and their effects on fish and other aquatic life, are a concern of Interior Department.

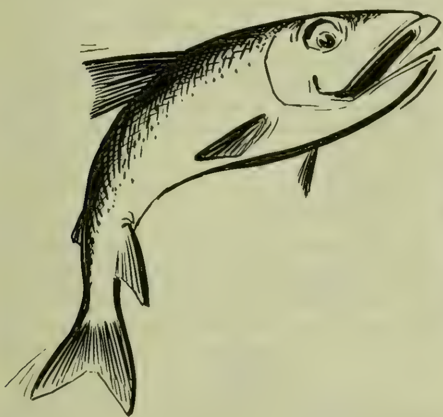
Water quality standards have been approved in whole or in part by: Oregon, except for a small part including the Klamath River and Goose Lake drainage areas; Georgia, New York, Indiana, South Dakota, Arkansas; Idaho, except for Bear River Basin; Maryland, Massachusetts, and North Dakota, except for Red River of the North.

Standards submitted by the remaining States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, and the Virgin Islands are being reviewed.

## Lake Trout Are Back in the Swim

The lake trout of Lake Superior, driven close to extinction by the fierce attacks of the eel-like sea lampreys, have been rescued by--man. In 1967, the lake trout were more abundant than at any time in nearly 30 years; they had increased over one-third in just one year. And only 2 percent of the trout examined showed the wounds of the lifesucking lampreys.

The lampreys first made their way into the Great Lakes in the 1940s--and came close to annihilating the lake trout of Lakes Michigan, Superior, and Huron.



### Counterattack

In 1958, scientists of BCF and the Canadian Government launched a 2-fold lamprey-control program, which was administered by the Great Lakes Fishery Commission. A "lampricide," a chemical developed by BCF scientists to kill only the larvae and young of lampreys, was spread through the parts of streams in which lampreys spawn.

And, to fill the ravaged ranks of the lake trout, vast quantities of juveniles were put into the affected lake areas.

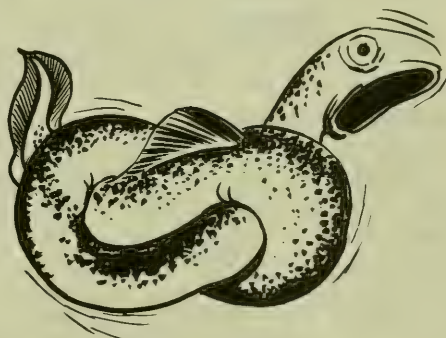
By 1961, in Lake Superior, the tide of battle began to turn. Since then, the lake trout have increased steadily--and the lampreys have declined steadily.

### Many Streams Treated

After Lake Superior, and by the end of 1966, all lamprey-infested streams entering Lake Michigan were treated. Hatchery-reared trout fingerlings were first put into the lake in 1965 and have grown well.

To aid Lake Huron's trout, lampricide treatment has begun of infested streams in the U. S. and Canada that flow into the lake.

Overall, the lampricide has been used on more than 250 infested streams that make their way into the Great Lakes.



### Lamprey Control May Cut Alewives Too

Lamprey control also may aid in the campaign against the unusually abundant herring-like alewife that was a great nuisance to Lake Michigan communities in 1967. Alewives died in great numbers. They were expensive to haul away, forced out some private owners, and hurt the tourist trade. Now, with fewer lampreys present, fewer lake trout and coho salmon will be killed by them. So more of the salmon now being planted will survive--and eat more alewives.

### Millions of Lake Trout Planted

In 1967, $5\frac{1}{2}$ million lake trout were planted in Lakes Superior and Michigan by Ontario

Province, the States, and the Bureau of Sport Fisheries and Wildlife. All in all, about 24 million hatchery-produced trout have been introduced into those lakes since the program started.

Salmon Thriving

In 1966 and 1967, Michigan put almost 4 million coho and chinook salmon into Lakes Superior and Michigan. In 1967, fishermen caught 31,000 coho, most over 11 pounds, in Lake Michigan. About 15,000 smaller cohos were caught in Lake Superior.

"Splake" May Make Splash

Canada has had good results from a 5-year experiment with "splake," a lake trout-brook trout mixture. She is considering introducing it into Lake Huron in 1969-70.

## Coho Salmon Will Be Introduced Into Lake Erie

Officials of U. S. and Canadian conservation agencies met in December 1967 to coordinate efforts to introduce coho salmon into Lake Erie. They proposed a limited first planting until the introduction could be evaluated. They suggested studies of coho competition with other species--and marking of coho so their place of origin would be known when captured. They recommended that the Lake Erie Committee of the Great Lakes Fishery Commission serve as coordinating agency; also, that the Commission act as clearinghouse for information on the program, and assign tagging marks to agencies.

The officials represented the Province of Ontario, the States bordering Lake Erie, Bureau of Commercial Fisheries, Bureau of Sport Fisheries and Wildlife, and the Commission.

States to Introduce Coho

In spring 1968, Pennsylvania proposes to introduce 100,000 coho fingerlings, Ohio 25,000, and New York may plant some.

## Three States Seek to Standardize Crab-Meat Pasteurization

Representatives from Maryland, North Carolina, and Virginia met at the Virginia Institute of Marine Science, Gloucester Point, Va., recently to discuss pasteurization of crab meat. The group included seafood processing specialists, members of State health departments, seafood packers and marketers, and researchers.

Larger Market Possible

It is generally agreed that the industry will benefit from marketing larger quantities of pasteurized crab meat because this improves keeping qualities. Pasteurized crab meat could be bought in more economical quantities by markets, hotels, and restaurants--and possibly could find markets outside the U. S. The Federal Statistical Digest shows that in 1965, Maryland, North Carolina and Virginia sold crab meat worth over $13 million--besides that sold canned or as soft crabs.

To Propose Standards

The participants agreed to prepare directives and set standards for pasteurization to assure a uniformly high-quality product. These will be presented to crab-meat processors and State officials for consideration.


## Weather Bureau Changes Coastal Warning Terms

The WHOLE GALE warning used in weather forecasts for marine interests along the coasts and on the Great Lakes will be changed to STORM warning, effective March 1, 1968, according to Dr. George P. Cressman,* Director of the U. S. Weather Bureau. The term STORM also will be applied to the flag-and-light signals formerly called WHOLE GALE signals, which are displayed at coastal locations.

STORM warnings and displays will indicate that winds of 48 knots (55 miles an hour) or more are expected.

HURRICANE WARNINGS will be issued to mariners and displayed as signals only when

storms of tropical origin are expected to cause winds of 64 knots (74 miles an hour) or more. When there is no tropical storm, a STORM warning will indicate forecast winds of any velocity over 47 knots.

These changes will make Weather Bureau terminology conform to that used internationally.

Now, the warnings and display signals will be:

SMALL CRAFT WARNING: One RED pennant displayed by day--and a RED light over a WHITE light at night--to indicate winds up to 33 knots (38 miles an hour) and/or sea conditions considered dangerous to small craft are forecast for the area.

IMPORTANT! The Small Craft Warning covers a wide range of wind speeds and/or sea conditions. Also, "small craft" include boats of many designs and sizes. Therefore, mariners should regard the Small Craft Warning display signal as an alert that wind and/or sea conditions potentially dangerous to their boats exist, or are forecast. For more specific information, they should obtain a detailed forecast by telephone--or listen to coastal weather forecasts and warnings over local radio stations, Coast Guard radio, or the Weather Bureau's continuous VHF/FM broadcasts on 162.55 megahertz where available.

GALE WARNING: Two RED pennants displayed by day and a WHITE light above a RED light at night to indicate winds within 34 to 47 knots (39 to 54 miles an hour) are forecast for the area.

STORM WARNING: A single square RED flag with a BLACK center displayed by day, and two RED lights at night, to indicate that winds 48 knots (55 miles an hour) and above, no matter how high the velocity, are forecast for the area.

IMPORTANT! If the winds are associated with a tropical cyclone (hurricane), the "Storm Warning" display indicates forecast winds of 48 to 63 knots (55 to 73 miles an hour).

HURRICANE WARNING: Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day, and a WHITE light between two RED lights at night, to indicate that winds 64 knots (74 miles an hour) and above are forecast for the area.

## EDA Approves BCF Fish-Farming Proposal

The Economic Development Administration (EDA) will provide BCF with $149,300 in technical assistance funds to help pay for an assistance program to the fish-farming industry in 9 South Central States. BCF will contribute $73,700 and provide research and information on harvesting, processing, and marketing catfish.

9 States Will Benefit

The project will cover the fish-farming areas of Arkansas, Alabama, Georgia, Illinois, Kansas, Missouri, Mississippi, Oklahoma, and Texas.

In recent years, growing catfish in ponds has been a profitable way of developing farm operations. From a few thousand pounds in 1963, production increased to estimated 15,000,000 pounds in 1965.

## ICC Blocks Reduction in Fresh-Fish Market Area

On Dec. 28, 1967, the Interstate Commerce Commission (ICC) overruled one of its examiners who had sought to reduce the area served by the Railway Express Agency (REA). At present, much fresh fish is distributed direct to restaurants and retailers by REA because it has a wider distribution area than motor carriers at each metropolitan terminal. Motor carriers are restricted to a smaller commercial delivery zone.

Examiner's Ruling Overturned

The ICC examiner had ruled that REA areas be cut to the sizes of motor carriers delivery limits. The action by the entire ICC maintains the present system.

The Secretary of the Interior supported REA on behalf of the U. S. fishing industry to continue the wide distribution of fresh fish.

## Customs Bureau Studies U. S. Imports of Canadian Cod Fillets

A notice was published by the U. S. Bureau of Customs in the "Federal Register," Jan. 5, 1968, stating that there are reasonable grounds to believe or suspect that the purchase price and exporter's sales price of cod fillets, frozen, from Eastern Canadian provinces is less than foreign market value. This value is defined in Antidumping Act of 1921, as amended.

Customs officers have been directed by the Commissioner of Customs to withhold appraisals of such frozen codfish until it is determined whether it is being sold at less than fair value. Retroactive antidumping duties cannot be assessed on imports that have been appraised.

## Import Regulations on Salmonid Fish Species or Eggs Amended

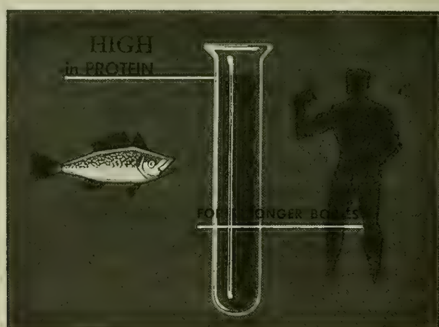
New regulations, effective July 1, 1968, covering import of certain harmful birds and fish species or fish eggs that may shelter diseases were announced Dec. 31, 1967, by Interior Department's Bureau of Sport Fisheries and Wildlife (BSFW). They were published in the "Federal Register," Dec. 21, 1967.

Section 13.7 of the regulations is entitled, "Importation of live or dead fish, mollusks, and crustaceans or their eggs." It requires that imports of live or dead fish of the family Salmonidae be certified free of viral hemorrhagic septicemia and myxsoma cerebralis, the organism causing "whirling disease" of trout. The diseases have brought heavy losses to trout hatcheries in Europe. These diseases pose no threat to human health.

### Exceptions

There are exceptions to the certification requirement: (1) salmon landed in North America and brought into the U. S. for processing or sale; (2) any salmonid caught in the wild in North America under a sport or commercial fishing license; (3) salmonid fish species or eggs that have been canned, pickled, smoked, or otherwise prepared which destroys the 2 diseases.

The fish-import prohibition was set after talks with the Canadian Wildlife Service.

# OCEANOGRAPHY

## Manpower Is 'Vital Ingredient' of Marine Sciences, Says Wenk

More progress was made in the marine sciences in the 1960s than during the preceding 100 years, but the "really crucial decade" will be the 1970s. And manpower is the "vital ingredient" of the marine sciences. So said Dr. Edward Wenk Jr., Executive Secretary, National Council on Marine Resources and Engineering Development, to the Symposium on Manpower for Oceanography in Houston, Texas, Nov. 20, 1967.

The oceans have had a profound influence on U. S. economic and political development, Dr. Wenk continued. Despite the Nation's "ocean-oriented beginnings, our natural awareness of the importance of the sea waxed and waned. Our indifference to the sea has been reflected in many ways. Although we achieved some notable firsts with charts of the tides, currents, winds, and shoals, our study of the ocean has lagged behind most of our other scientific pursuits."

Congress Helped

In 1966, the 89th Congress enacted the Marine Resources and Engineering Development Act. It became U. S. policy, for the first time in history, "to develop, encourage, and maintain a coordinated, comprehensive, and long-range program in marine science for the benefit of mankind." Dr. Wenk explained: "Congress was no longer thinking in terms of narrow scientific disciplines, but in terms of the social purposes to which science and technology might be directed."

Discussing the challenge of the sea, Vice President Humphrey, chairman of the National Council on Marine Resources and Engineering Development, said the sea may contribute to the solution of the following great human problems:

• "There are one and one-half billion hungry people in the world. The full food potential of the seas, seriously neglected in the past, must be realized to combat famine and despair. . . .

• "Seventy-five percent of our population lives along our coasts and Great Lakes... (yet) only three percent of our ocean and Great Lakes coastline has been set aside for public use or conservation. . . .

• "The continuing threats to world peace require our Navy to maintain a high level of readiness and versatility through a sea-based deterrent and undersea warfare capability. . . .

• "Thirty million Americans swim in the oceans, 11 million are salt-water sport fishermen, and 8 million engage in recreational boating in our coast States, yet industrial wastes being dumped into the ocean tributaries will increase 7-fold by the year 2000 unless there are drastic changes in waste handling.

• "Ocean-generated storms cause millions of dollars of damage annually along our coasts, but marine weather warning services are available to less than one-third of our coastal areas."

Dr. Wenk noted that as population grows, the demands for energy will keep pace. Offshore oil and gas will grow in importance in 1970s and beyond.

Range of Marine Science Activities

The marine sciences encompass many activities. Wenk listed: "national security; fisheries development and seafood technology; transportation; recreation; pollution abatement and control; international cooperation; marine minerals, chemicals, and energy resources; health; shore and harbor engineering; weather prediction and control; and the romance of pure science, too. Underlying and cutting across those functions are basic oceanographic research, mapping, ocean observation and prediction, general purpose engineering, data collection and analysis, and specialized education."

Occasionally, crises will focus attention on these activities, Wenk noted, "but in the absence of a crisis, how can we unite the ocean sciences and public policy?" The Marine Resources and Engineering Development Act of 1966 assigned leadership to the President and set up the Marine Sciences Council to help him. No objective of U. S. marine science activities is more important than one included in the Act: "The effective utilization of the scientific and engineering resources of the Nation, with close

Fig. 1 - Measuring a sample of the catch. Size of fish concerns both scientist and fisherman. (Photo: "Seattle Times")

cooperation among all interested agencies, public and private, in order to avoid unnecessary duplication of effort, facilities, and equipor waste."

Marine Sciences Manpower Today

Dr. Wenk affirmed: "In the United States today our oceanographic research ranks with the world's best. Our scientists rank with the world's finest. Other nations have small numbers of extremely competent scientists, but only the USSR can be compared to the United States for the extent and quality of its research capability."

This situation portrays to Dr. Wenk "a most evident truth," first of 4 points he made at the symposium:

I

"Manpower is the vital ingredient of the marine sciences."

In the past 6 or 7 years, the U. S. "sharply increased its investment in training, education, and facilities in oceanography as in the other natural sciences. The results are becoming evident.

| Oceanographic Degrees | | |
|---|---|---|
| Year | Enrollment | Ph. D. Degrees Granted |
| 1961 | 105 | 9 |
| 1963 | 188 | 8 |
| 1965 | 520 (est.) | 25 |
| 1967 | 980 (est.) | 60 (min.) |

From 1957-1963, financial support quintupled. "That almost explosive growth" was made possible because "a core of newly trained professionals" had emerged. It had become possible to attract into ocean research,

Fig. 2 - Job Corps trainees from Wellfleet, Mass., join BCF's "Albatross IV" for demonstration cruise. Ship's staff explained equipment. Biologists of BCF's Woods Hole Laboratory demonstrated scientific gear in electronic rooms and labs. A fishing tow was set. Group watches cod end being lowered into sorting box. (Photos 2-4: Robert K. Brigham)

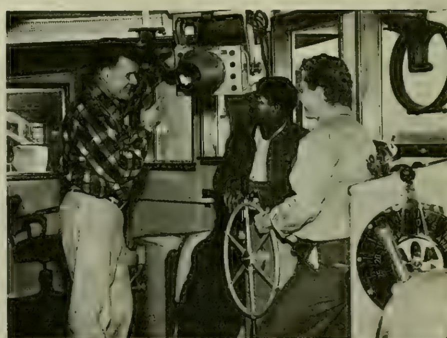


Fig. 3 - Albatross IV's 2nd mate, Robert Grant, explains wheelhouse equipment to Job Corpsmen.

Fig. 4 - J. J. Murray (wearing USDI helmet), a BCF Safety Officer, shows trainees in on-the-job classroom safety precautions to follow while spooling trawling cables onto trawl winch drums.

Program is sponsored by New Bedford (Mass.) Fishermen's Union and local Seafood Producers Assoc. under U. S. Labor Department's Manpower Training and Development Act. It provides valuable instruction in commercial fishing to youths interested in making it their livelihood.

Program includes on-the-job experience aboard vessels and on-shore instruction in net mending, navigation, and engine and deck equipment and repair. As a result, 61 new fishermen have been added to New England fishing fleet.

competent men trained in other disciplines. More and better-equipped research ships and specialized laboratories became available.

Dr. Wenk emphasized: "Manpower is the vital ingredient in the marine sciences, and not just in terms of numbers. We need diversity and quality as well as quantities of people. We need intellectual as well as statistical support. We need to take a headcount even more than we need to take a nosecount."

II

"When we consider the variety of marine science activities, we realize the different kinds and combinations of manpower involved."

Oceanography involves every field of science and every field of engineering, economics, law, public administration, foreign affairs--and institutions, the U. S. Government and all governments, States, industries, and universities. When Congress established this program, it "thought in terms of large social purposes. And in implementing the legislation, we are aggressively seeking ways and means of linking the oceans to the needs and aspirations of people." However, there is a danger in "arbitrary linkages," and the "essential core of science" must not be overlooked.

Dr. Wenk emphasized: "In my view, the best way of guarding against that hazard is by maintaining a creative, vigorous, and growing foundation of basic research and education. We must do everything possible to attract the best young minds to this field recognizing that we are in competition with others offering glamour and challenge."

Sea-Grant Program

Dr. Wenk pointed to the value of the Sea-Grant concept, part of the Marine Sciences Program, which includes many disciplines, including law and economics. Its philosophy is that "it is the collaborative effort of all these skills that gives the marine enterprise its strength." The program is being conducted in the universities--"with continuous interaction among the Federal Government, the schools, and industry to examine common problems and to pool diversified resources, facilities, and specialized talents for their solution."

The Sea-Grant program "recognizes that we need people with different levels of training--technicians, practitioners with B.S. degrees only, master's degree professionals, Ph.D.'s, and those with postdoctoral education. It recognizes that we need great varieties of specialists and generalists, from the sciences, the social sciences, the humanities, and other fields. And it recognizes that we must have people who can think horizontally as well as vertically."

Dr. Wenk made clear: "I believe in the multidisciplinary approach, for it is the only way to make progress in today's complex society using today's complex technologies." But he cautioned against a development that was the third major point he made at the symposium:

III

"We cannot let the complexity of requirements for either manpower or technologies obscure the core of oceanography."

The multidisciplinary approach does not imply that "oceanographers will be superseded

by general scientists, jacks-of-all-trade." Dr. Wenk quoted from "Effective Use of the Sea," the report of the President's Science Advisory Committee. It recognized the oceanographer's role: "From these individual scientists come most of the ideas which are translated into questions about the oceans, which, in turn, motivate larger, organized data-collecting projects... .Our reason for mentioning the role of these individuals is to emphasize how essential they are and to insure that this effort is not overlooked in the hurly-burly of larger plans."

Dr. Wenk emphasized that the oceanographer, far from being obsolete, was "at the core of the marine sciences effort of the present and the future. The only concern I have about his role is that I want to see it strengthened."

IV

"While more progress has been made in the marine sciences in the 1960s than in the preceding 100 years, the really crucial decade will be the 1970s."

Dr. Wenk asked the members of his audience what contributions they, their institutions, and their professions were prepared to make over the next 10 years to meet such problems as: "feeding the world's hungry masses with food from the sea; preserving the quality of the coastal zone; strengthening international cooperation; enhancing safety at sea; rehabilitating our harbors and cities; recovering the minerals from the continental shelf and the deep oceans; exploring the oceans, observing and predicting the atmosphere, and controlling the weather; basic and applied research as well as engineering relating to the marine sciences; and educating those who would do such jobs."

3 Critical Manpower Needs

When oceanography was young, Dr. Wenk said, there were no scientists with specialized training. Its rapid growth was made possible by bringing in people with training in one of the more basic sciences. Teachers of oceanography agree that "the prime requisite is a sound foundation in basic science... specialized formal study is not a requisite for a competent oceanographer" and it is desirable to attract people from other disciplines at the postdoctoral level.

He listed 3 critical marine sciences manpower needs:

1. "We must maintain the momentum and increase the level of support for the scientific study of the sea, with related education."

He said the Marine Sciences Council is examining multi-year support and ways of increasing and funding long-range ship operations. "We expect the Federal role to continue to be one of leadership, planning, and assistance to all sectors involved in marine sciences activities." But the private sector must be intimately involved in its traditional role of developing resources. "They have a need for specialized manpower and thus a responsibility to share in training through fellowships and research grants."

To maintain the momentum, oceanography needs an improved status and more money within institutional boundaries and budgets. Schools should consider training foreign students in the marine sciences.

2. The second critical priority need is to intensify the training of engineers. "Ocean engineering integrates many existing engineering and scientific disciplines and applies them to the ocean environment. The field is

Fig. 5 - Vehicle to study ocean's upper layers. Biologist Reginald Gooding in observation chamber of raft "Nenue" of BCF's Biological Laboratory in Honolulu.

Gooding designed and built it to study fishes that accumulate under floating objects at sea. View chamber extends 7 ft. under water. In cramped quarters, biologists view and photograph many creatures. (Photo: J. J. Magnuson)

similar in scope and concept to aeronautical and astronautical engineering, which are directed toward and controlled by the environment in the atmosphere and outer space."

At the Massachusetts Institute of Technology, ocean engineering "emphasizes the principles governing the systems for the exploration and utilization of ocean resources, the conduct of oceanographic research, and the recovery of objects from the ocean floor." It includes special surface vehicles, submerged vehicles, stationary floating platforms and structures, support of ocean mining and oil drilling, and other subjects.

3. "The third critical priority need is to train technicians who can assist both the scientist and the engineer aboard ship, in the laboratory, in the marshlands, or wherever the oceanographer or ocean engineer's work takes him and the marine sciences team."

This team will need many disciplines, levels of competence, and training. Scientists and engineers will be able "to switch from land-based, non-ocean-oriented activities with relative ease," if universities have refresher courses, or training is available somewhere else.

Education and training will be necessary. Junior colleges and technical schools have been increasing and they can be adapted easily to meet the needs for technicians. "Our colleges, universities, and oceanographic institutions have but to mesh their programs with those of nearby junior colleges--found now in all 50 States--to provide a total educational system adapted to the needs of the marine sciences and society in the 1970s."

A source of manpower is the economically deprived. "They share the problems of the seas but not the benefits. They inhabit the waterfront slums and work at the most menial jobs on the docks. What I am suggesting is that we move towards solving this shortage of technicians by carrying the story of oceanography to minority groups who would be attracted to these opportunities. Then let us make certain that we train and promote them as rapidly as their progress permits."

## "Discoverer" Seeks Clues to Origin of Continents

During February and March, the U. S. Coast and Geodetic Survey ship Discoverer will be seeking evidence that Africa might once have been connected to North America in one supercontinent. The Discoverer sistership of the "Oceanographer," is conducting a 3-month, 20,000-mile expedition to gather information from the depths of the South Atlantic off the west coast of Africa.

The Discoverer's survey off west Africa is along the 1,200-mile edge of the continent between Dakar and Abidjan. Subbottom penetration soundings are being made along the 1,000-fathom (6,000-foot) isobath or contour line. A seismic reflection profiler is used to detect the geologic structure below the sea bottom.

"The purpose is to try to match the continents at a point halfway between the surface of the continents and the deep sea. The $2\frac{1}{2}$-mile-high continental slopes, which connect the continental shelves with the deep-sea floor, are the true geologic boundaries of the continents."

1 vs. 2 Supercontinents

If the concept of one supercontinent is correct, then the Discoverer should find evidence linking Africa to North America. The bulge of Africa around Dakar would fit, jigsaw-puzzle style, into the southeastern U. S.--from about Cape Hatteras, N.C., to Florida, and then outside the Bahama Islands.

But if the survey produces evidence that the area around Abidjan fits against northeastern Brazil off the Amazon River, it would tend to support the 2-continent theory.

In 1967, the Oceanographer made similar surveys along the east coast of South America and off Australia.

## Foreign Fishing Off U. S. in December 1967

IN NORTHWEST ATLANTIC

Nineteen fishing vessels from Poland, East and West Germany, and the Soviet Union fished in the Northwest Atlantic off southern New England, New York, and the New Jersey coasts in December 1967; 46 were sighted in November 1967. No foreign fishing vessels were reported off the east coast during December 1966.

Weekly sightings showed sharp decline from 16 vessels in first week of December to a scattered few by year's end.

Soviet: For the third consecutive month, there were only 5 or 6 factory stern trawlers and an occasional supply ship--scattered widely along southern New England areas and off Long Island, N. Y. At times, these vessels fished only 15 miles from Long Island.

Although her vessels were usually observed actively fishing, no catches were observed. Over the past several months, these vessels were presumed engaged in exploratory fishing. Late in the month, one factory stern trawler was reported fishing off Virginia. The catch was believed to be red hake and whiting.

In December 1966, no Soviet vessels were sighted off east coast.

Polish: The sizable fleet deployed on Georges Bank and off southern New England since mid-1967 shifted its attention at end of November to fishing grounds off eastern Nova Scotia and Newfoundland. Two vessels fished briefly south of Block Island, R. I., early in December.

East German: One freezer stern trawler was observed fishing among other vessels south of Long Island. It was reported off New Jersey among West German vessels in late December.

West German: Early in December, 8 freezer stern trawlers were sighted in a 15-mile area 15 to 30 miles south and southwest of Montauk Point, L. I. Trawls containing huge catches of fish, believed herring, were observed on board.

By mid-month, a New Jersey sport fishing boat operator reported that 7 West German stern trawlers were fishing 20 to 30 miles southeast of Manasquan Inlet, New Jersey. They were presumed fishing for herring.

IN GULF OF MEXICO

No foreign fishing vessels were sighted off U. S. during November.

OFF CALIFORNIA

Soviet: 18 vessels were sighted during December. Most were large stern factory trawlers (13 units); but 1 medium freezer trawler, 2 fishery research vessels, 1 refrigerated fish transport, and a passenger ship also were sighted.

Only 2 of the 18 stayed the entire month; the rest only a week or two at different times. From 5 vessels sighted in first week, fleet increased to 12 by mid-month, then decreased to 3 during last 2 weeks.

The vessels moved all month--indicating Soviet fisheries there are not yet firmly established.

In first week, Soviets fished off Crescent City in northern California with 6 stern factory trawlers. By mid-month, a few of these had gone as far as San Nicolas Island off San Francisco. From there, some might have gone further south towards Mexico. By month's end, only 2 trawlers were fishing off northern California.

During second week, most Soviet fishing was off San Francisco and near Santa Barbara Island in southern California. At least 8 stern trawlers were sighted off San Francisco: 5 fishing, the others apparently in transit southward. Those off Santa Barbara were a modern 6,300-gross-ton refrigerated fish carrier (the "Sibir") receiving frozen catch packed in paperboard boxes from 2 large stern trawlers. After unloading, all 3 vessels went north.

During second-half December, only 2 stern trawlers fished off northern California; 2 others were in transit.

Although 2 research vessels were seen for short periods off California, it is unlikely that much research was done. The flagship of the Pacific Institute for Fisheries and Oceanography, "Akademik Berg," was sighted 18 miles

southeast of San Nicholas Island (about 40 miles southwest of Los Angeles) on December 5. Apparently, she was on her way to explore for new commercial stocks in the South Pacific off New Zealand and Australia. The "Ogon," which had spearheaded fishery research in the northeastern Pacific, entered San Francisco Bay on December 18 for emergency medical treatment of a crew member. The vessel waited until his discharge from the hospital just before Christmas.

No violations of U. S. 12-mile contiguous fishing zone were reported, but on 4 occasions Soviet vessels fished just beyond zone (from 12-13 miles off U. S. shore).

No information on species caught is available. Only once was Soviet catch identified: one stern factory trawler was catching "red and black" bottomfish about 12 miles off Crescent City.

The pattern of Soviet fishing in December 1967 was similar to that of December 1966, with one exception: the vessels sighted had doubled. If past experience can indicate future trends, these developments in Soviet fisheries off California may be expected: From January through March 1968, fewer than 10 vessels will operate off California. Some will fish, others will conduct exploratory commercial fishing, and many will transit to and from South Pacific fishing grounds. By April 1968, the fleet will at least double and remain at that level until Pacific hake fishing starts off the Pacific Northwest. From then on, Soviet fisheries off California will fluctuate, depending on success of hake and ocean perch fisheries to the north.

The scattered information available on Soviet fishing off California again indicates that only part of the fleet is sighted by surveillance patrols. During 1967, an average of about 5 was sighted weekly. The actual number was perhaps 2 or 3 times that figure.

Japanese: In mid-December, a 500-gross-ton seiner left Japan to fish bluefin and yellowfin tuna in the eastern Pacific Ocean. The vessels plan to fish "off the California coast" until about March 1968, then to proceed southward to waters off Mexico and central America. About June, it will enter the tuna fishery in the Atlantic Ocean off Africa. By the end of December 1967, this vessel had not been sighted off the U. S. coast.

OFF PACIFIC NORTHWEST

Soviet: Bad weather and poor visibility made surveillance of foreign fishing off Washington and Oregon difficult in early and late December. The vessels sighted decreased rapidly in late November and first week of December--from about 35 to fewer than 10. All were fishing vessels, mostly large stern factory trawlers. No processing vessels were sighted, an indication that catches were not too good. Some stern trawlers, however, had their reduction plants operating, indicating production of fish meal. The number of vessels sighted was somewhat larger than in December 1966.

Soviet vessels operated off Oregon during first-half December; during second part, they were sighted mostly off Washington. By December's end, only 2 stern trawlers were fishing about 15 miles west of Destruction Island, Washington.

No information is available on the species caught.

One research vessel (the Ogon) was sighted conducting undetermined research; late in month she was off San Francisco for the emergency medical evacuation.

Japanese: 2 stern trawlers and 1 support vessel were reported operating at various times and points off Washington and Oregon, and northward off southern British Columbia. It is believed these vessels were taking hake and Pacific ocean perch.

OFF ALASKA

Soviet: The number increased steadily from 20 in early December to about 70 vessels in late December. The main reason was the discontinuation of fisheries off Pacific Northwest.

The Pacific ocean perch fishery in Gulf of Alaska was conducted by 8-15 vessels. Three stern factory trawlers and one medium trawler fished off southeast Alaska. One stern factory trawler operated on Yakutat grounds and another fished Portlock Bank area. At least 3 stern trawlers fished on Albatross Bank (east of Chirikof Island). During first week, 6 stern factory trawlers fished for perch along central Aleutians and apparently stopped in mid-December.

The deep-water trawl fishery, between 600 and 900 meters, was resumed north of Fox Islands in early December by 5 medium freezer trawlers; by month's end, 3 more freezer trawlers joined fishery, mainly sablefish and turbot.

The winter flounder fishery began in early December, when 8 trawlers appeared on traditional grounds in eastern Bering Sea, about 45 miles north of Unimak Island. By month's end, the fleet numbered about 50.

Japanese: Fishing effort increased from fewer than 10 vessels during first week to about 45 ships by month's end.

The number of factory trawlers fishing Pacific ocean perch in Gulf of Alaska varied from 2 early in month to 4 by end. One trawler fished along 100-fathom curve between Yakutat grounds and Portlock Bank early in December. During same period, a second operated off southeast Alaska near Cape Ommaney. During last week, a smaller stern trawler entered Kodiak for medical assistance, and then resumed fishing in Gulf of Alaska. The 4th factory trawler was scheduled to depart Japan prior to Christmas to resume perch fishing in Gulf.

Two factory ships, accompanied by about 16 trawlers and 2 reefers, began "winter trawl fishery" for Alaska pollock in early December in eastern Bering Sea north of Fox Islands. One fleet will fish primarily for Alaska pollock to produce minced meat. In late December, 2 more fish meal and oil factory ships, with 18 trawlers, joined trawl fishery. These 2 fleets are producing fish meal and oil; they are using primarily flatfishes and Alaska pollock.

Two long-liners continued to fish for sablefish in central Gulf of Alaska through most of December. One long-liner was reported, in mid-December, fishing off eastern Aleutians north of Fox Islands.

FREE BCF FISHERY INDUSTRIAL RESEARCH JOURNAL

At intervals, the Bureau of Commercial Fisheries publishes "Fishery Industrial Research," a journal of research papers dealing primarily with fishery technology--fishing methods, marketing, fish preservation, etc.--and occasionally with economics.

Anyone may receive this journal by requesting to be put on the mailing list. Write to:

Bureau of Commercial Fisheries
Branch of Reports
Bldg. 67, U. S. Naval Air Station
Seattle, Washington 98115

# STATES

## Massachusetts

### SEA HERRING FISHERY CHANGES

During 1967, tactics and fishing areas shifted in the Massachusetts sea-herring purse-seine fishery. Before, the fishery centered in the Cape Cod area during spring and fall. Landings were under 2 million pounds. An airplane spotted surface schools, which were fished with shallow purse seines.

In fall 1967, Canadian herring seiners fished the offshore waters near Cape Ann. They used sonar gear to locate subsurface schools and were equipped with deep seines. The catches were unloaded directly from seines to U. S. fishing vessels, redocumented as carrier vessels, and landed at Gloucester, Mass.

From August through November 1967, Gloucester landings--classed duty-free imports--were about 12 million pounds. Over one half was landed during October.

## California

### 1967 PELAGIC FISH LANDINGS DROPPED

The Resources Agency of California reported in December 1967 the pelagic fish catch for that month and for 1967:

| Species | December | | January 1 - December 31 | | |
|---|---|---|---|---|---|
| | 1967 1/ | 1966 | 1967 1/ | 1966 | 10 Yr. Mean 1956-1965 |
| | ...... (Landings in Tons) ...... | | | | |
| Anchovy...... | 1,360 | 6,196 | 33,166 | 31,140 | 7,353 |
| Mackerel, jack.. | 1,215 | 1,169 | 18,426 | 20,431 | 36,584 |
| Mackerel, Pacific. | 10 | 185 | 379 | 2,315 | 19,046 |
| Sardines...... | 5 | 4 | 76 | 439 | 26,774 |
| Squid....... | 800 | 1,183 | 9,632 | 9,513 | 6,394 |
| Total..... | 3,390 | 8,737 | 61,679 | 63,838 | 96,151 |

1/Estimated. Accumulated landings are revised monthly.

* * *

### LANDINGS OF ANCHOVIES

The current anchovies-for-reduction season runs from Sept. 15, 1967-May 15, 1968.

Through Jan. 1, 1968, California fishermen landed 5,413 tons of anchovies for reduction, reports the California Department of Fish and Game. This was 2,013 tons over landings reported in December 1967.

The Department said the price for anchovies at San Pedro remain unsettled. Los Angeles fishmeal prices--about $124 a ton--remain below those of previous years. This probably is an obstacle to achieving price agreement at San Pedro.

#### Quota Set in August 1967

In August 1967, the Fish and Game Commission approved California's third consecutive anchovy reduction season. It set a 75,000-ton quota, the same as in past seasons. But the quantity to be taken in inshore zones is lower and the zones smaller. The bulk of the landings through January 1, 4,600 tons, was in the Northern permit area--north of Point Conception.

#### 191,000 Anchovies Tagged

As of early January, 190,986 anchovies had been tagged by Department personnel. During December 1967, 13 tags were recovered, bringing total to 523. Twelve of the 13 tags were brought in at Monterey, and one at San Pedro. The fish had been free from 119 to 645 days. A tagged anchovy taken at San Pedro apparently had been eaten by a bonito or mackerel; the tag was recovered from a plant processing only the larger predator.

* * *

### SAN FRANCISCO CRAB FISHERY IS DECLINING

The San Francisco crab fishery has declined to the point where about one-third the vessels have stopped fishing, reported the Resources Agency of California in December 1967. Some of these entered the northern California fishery. Approximately 40 vessels are still in the fishery

Strong winds, coupled with poor catches, caused most fishermen to pull gear only once or twice a week. As of mid-December 1967, about 525,000 pounds had been landed in the San Francisco area. The price to fishermen dropped from 30 to 22 cents per pound the day after the northern California opening on December 1.

N. California Price Even Lower

In northern California, the price for crab dockside was 18 cents per pound. The season started slowly. Bad weather kept most of the fleet tied up the first week. Weather improved during the second week, and fishermen in Eureka and Crescent City were able to land approximately 1.4 million pounds by December 17. On December 18, a price dispute kept boats tied up until December 21. Then dealers agreed to continue to pay 18 cents per pound, with specified poundage market limits.

## Oregon

SPRING CHINOOK SALMON RELEASES UNDERWAY

The annual Willamette River spring chinook salmon releases are underway at its hatcheries, reports the Oregon Fish Commission. Until mid-March, the Willamette River from Eugene to the mouth of the Columbia River will be full of young ocean-bound migrants. When the season's releases are complete, more than five million 5- to 6-inch-long spring chinook will be on their way to the sea.

In December 1967, about 1,800,000 smolts--salmon ready to migrate immediately upon release--were liberated from the Fish Commission's Willamette and McKenzie Hatcheries. Those releases were followed in January 1968 by "1,680,000 from Marion Forks Hatchery into the North Santiam below Big Cliff Dam, another 1,300,000 into the Middle Fork Willamette from the Willamette Hatchery, 200,000 from the McKenzie Hatchery, and 150,000 from the South Santiam Hatchery."

In early January 1968, over 50,000 spring chinook smolts from the Sandy Hatchery were released into the upper reaches of the Sandy River. In addition to the smolts, the commission also has ready to release three million unfed fingerlings. One million will go into Green Peter Reservoir and another million into Fall Creek Reservoir. Foster Reservoir on the South Santiam and the Mollala River each will receive one-half million fry.

1967 Run Largest Since 1956

The 1967 Willamette River spring chinook run was the largest since 1956. A record number of adult salmon returned to the Commission's hatcheries. Hatcherymen took an additional $2\frac{1}{2}$ million spring chinook eggs for the Washington Department of Fisheries' mammoth hatchery on the Cowlitz River.

More than 1,600 of the adult salmon that returned to the commission's Willamette hatcheries were transplanted into the upper Clackamas River. Another 800 were transferred to the Fish and Wildlife Service hatchery on Eagle Creek; over a thousand were hauled to Fall Creek and Green Peter Reservoirs for natural spawning.

## Florida

EXPERIMENT IN 'FARMING THE SEAS'

Florida State University is "farming the seas" in an experiment to raise shrimp from the larval stage. Dr. Carl H. Oppenheimer, chairman of the department of oceanography, said his department will study the feasibility of growing shrimp on a commercial scale using indoor tanks.

Dr. Oppenheimer said shrimp never have been grown commercially in the U. S., but the Japanese cultivate fish, shrimp, oysters, and other sea animals in large quantities. He has visited some Japanese installations.

The experiment is supported by a $35,000 grant from Armour Research and Development Company.

## Michigan

PLAN SET FOR COMMERCIAL GILL NET FISHING

Regulations concerning the use of gill nets by commercial fishermen in Michigan waters of the Great Lakes were approved by the Michigan Conservation Commission at its December 1967 meeting, reports the Great Lakes

News Letter. They are expected to protect trout and salmon stocks being planted in the lakes without severely restricting commercial operations. The action is a compromise. An earlier proposal had called for a virtual ban on gill nets on the state's sections of Lakes Michigan and Superior.

The plan becomes effective in April 1968. It calls for a permit system to regulate the use of small-mesh gill nets--$2\frac{1}{2}$ to $2\frac{3}{4}$ inches--in waters less than 35 fathoms, and nets of $4\frac{1}{2}$-inch mesh or larger at depths designated by the Department of Conservation. No restriction will be placed on small-mesh nets used in waters over 35 fathoms deep. Permit holders will be required to submit catch records. The data will aid in fishery management.

## Alaska

### SCALLOPS ARE NEWEST FISHERY

The Alaska fishing industry has shown increasing interest in the commercial prospects for sea scallops since BCF's "John R. Manning" located good concentrations in the Gulf of Alaska in 1963.

Industry interest was turned into action by two recent developments: the slump in king crab landings, down 20 percent in 1967, and the sharp increase in East Coast scallop prices which, in December 1967, was $1.30 per pound, compared with 65 cents a year earlier.

BCF's Exploratory Fishing and Gear Research Base has loaned scallop dredges and other gear to interested vessel owners. Two Kodiak-based vessels, "Virginia Santos" and "Cloverleaf," went looking for scallops near Kodiak--with some success.

#### How Vessels Fared

The Virginia Santos, with an experienced Nova Scotian scallop fisherman aboard, took 1,500 pounds of scallops in a short day on the flats very close to Kodiak. On another short trip, 4 hours' dragging time, she took 70 bushels; one 30-minute drag produced 20 bushels. Everyone concerned with the operation was optimistic. The experienced scallop fisherman said that their catches could be regarded as good as anywhere.

The Cloverleaf, fishing in Raspberry Straits (Afognak Island) with a home-made rake affair, delivered 4,000 pounds to Point Chehalis Packing Co. on her last trip. Recovery was running about 13.2 percent.

## Texas

### QUALIFIES FOR U. S. AID AS RESULT OF HURRICANE BEULAH

Texas qualifies for up to $50,000 of U. S. aid to restock the oysters killed by Hurricane Beulah in September 1967, reports the Coastal Fisheries Coordinator for the Texas Parks and Wildlife Department. A notice from the Secretary of the Interior said the State was eligible for funds set aside for the rehabilitation and restoration of natural resources because the oyster loss resulted from "natural causes."

#### Central Coastal Area Considered

The State is considering reseeding oysters in the central coastal area, where rampaging rivers devastated the oyster beds. The San Antonio-Espiritu Santo Bay System is an area where reseeding could reestablish oysters faster than could natural spawning from surviving stock in nearby areas.

Oysters would be transplanted on historically productive reefs in the spring--after the oyster fishing season and just before the spawning period.

# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## Pacific Hake's Behavior Limits Efficient Harvest to Daylight Hours

Research by BCF's Exploratory Fishing and Gear Research staff at Seattle, Wash., has revealed knowledge useful to the commercial fleet about the daily vertical movement of Pacific hake. As sunset approaches, the dense schools of hake present near the sea bottom during daylight hours begin to rise and disperse. As sunrise approaches, the hake begin to descend again toward the bottom and regroup. During early-morning daylight hours, the hake have resumed schooling near the bottom. Exploratory catch rates of hake were much higher during daylight than during night fishing in the same general area where hake signs were detected by electronic gear.

Catch Rates

Catch rates with a modified "Cobb" pelagic trawl ranged from 10,000 to 60,000 pounds per half-hour for daylight fishing--compared to 60 to 6,000 pounds per half-hour during late-evening and night fishing. This behavior pattern limits efficient harvest of the fish with existing fishing techniques to daylight hours.

The daily vertical migrations of hake coincide with the daily vertical movement of euphausiids, a dominant shrimplike food organism of the hake. However, the daily changes in vertical distribution and integrity of hake schools may occur with or without euphausiids present.

## Shad Bests Nehu as Skipjack Bait

The threadfin shad (Dorosoma petenense) produced higher catch rates than did nehu (Stolephorus purpureus) as live bait for skipjack tuna (Katsuwonus pelamis) in Hawaiian waters. (BCF's "Charles H. Gilbert," Cruise 106, Oct. 30-Nov. 28, 1967.)

Experimental pole-and-line fishing using these baits was conducted with 4 tuna schools 8 to 28 miles west and northwest of Niihau Island. Threadfin shad also was chummed in the vicinity of bird flocks on 5 other occasions; small skipjack tuna were observed to come to the stern on 2 of these occasions.

The experimental fishing results are:

| Station No. | No. of Fishing Periods | Skipjack Catch | | Skipjack Catch Per Minute | |
|---|---|---|---|---|---|
| | | Shad | Nehu | Shad | Nehu |
| 5 | 7 | 128 | 90 | 6.9 | 6.2 |
| 6 | 6 | 143 | 65 | 15.9 | 7.6 |
| 8 | 10 | 158 | 32 | 10.2 | 2.2 |
| 9 | 1/2 | 42 | 26 | 4.7 | 8.7 |
| Total . . . . . . | | 471 | 213 | 9.4 | 6.1 |

1/Ran out of nehu after first fishing period.

Except at station 9 (see map), where highly unequal fishing periods make results questionable, the threadfin shad produced higher catch rates than did nehu. This is attributed to a marked difference in the behavior of the two baits. Most threadfin shad tended to swim downwards at angles of about $20^{\circ}$-$45^{\circ}$, while most nehu swam downwards at angles of about $40^{\circ}$-$80^{\circ}$. The nehu also swam faster than the shad. This resulted in the skipjack being distributed deeper in the water when nehu were fished--and closer to the surface (and the hooks) when shad were fished.

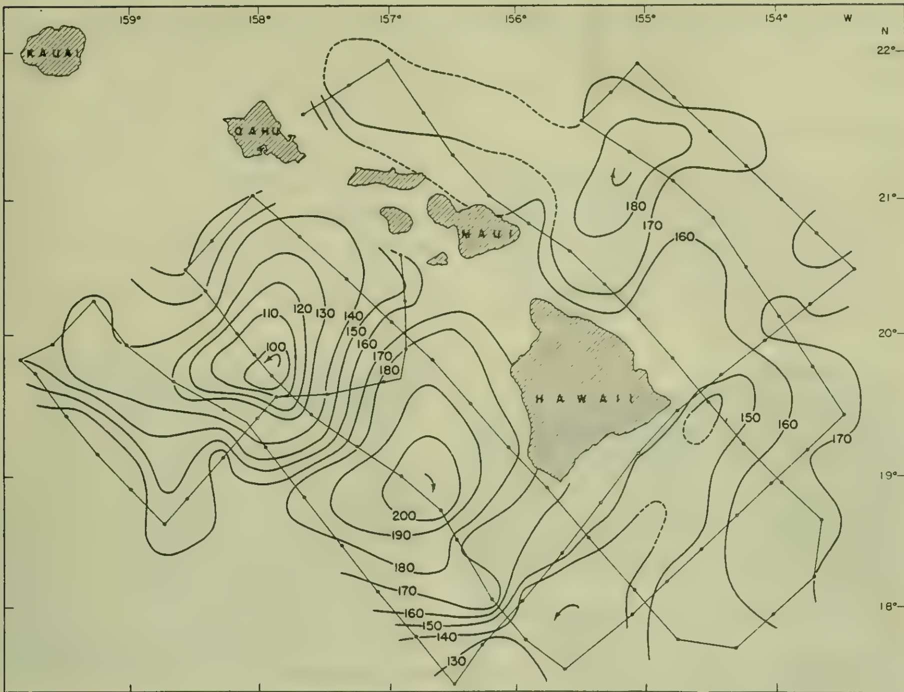
The total catch of skipjack was 694. The range in fork lengths was 49.1-67.1 cm., the range in weight was 6.5-18 pounds.

Determine Thermocline Structure

A second major mission of the Gilbert was to determine the thermocline structure in the vicinity of the Hawaiian Islands.

A total of 101 BT lowerings was made. Two major eddies, each 100 miles in diameter, were located southwest of the islands. One, with its center near $20^{\circ}$ N. and $158^{\circ}$ W., rotated counterclockwise, raising the thermocline approximately 70 m. above its equilibrium level. The other, located near $18.5^{\circ}$ N., $156.5^{\circ}$ W., rotated clockwise, depressing the thermocline some 70 m. Over the rest of the cruise track, to the south and east of the islands, the thermocline was relatively featureless and flat.

There was some evidence that the two large eddies moved westward during the 2-week duration of the study, but it was not possible to




Track chart for Charles H. Gilbert cruise 106 showing depth of 20° isotherm (meters), Nov. 15-28, 1967.

determine the extent of this motion with a single ship in the time available.

Surface current velocities of 1 to 2 knots were associated with the eddies, as judged by the set experienced by the ship.

## Lake Superior Smelt and Chub Catches Are Good

Despite winter conditions, BCF-directed exploratory fishing in Lake Superior using the privately owned trawler "Hiawatha" (out of Duluth, Minn.) produced fair-to-good catches of smelt and chubs.

One 4-day cruise in early December 1967 landed an average 599 pounds per hour of mixed smelt and chubs. A later 4-day December cruise landed 26,439 pounds of virtually pure smelt at average rate of 2,937 pounds per hour.

About 60 percent of smelt caught during both cruises were jumbo size: 4 to 6 fish per pound in the round.

## Report on Financial Aid to Fishing Industry

From the beginning of the Federal Fisheries Loan Fund in 1956 through Dec. 31, 1967, 2,058 applications for $55,011,668 were received by BCF, the administering agency. By that date, the record was: 1,066 applications ($24,957,653) approved, 640 ($15,385,223)

declined or found ineligible, 303 ($11,101,494) withdrawn by applicants before processing, and 49 ($1,414,592) pending. Of applications approved, 380 were for amounts less than applied for--total reduction was $2,152,706.

Mortgage Insurance

Under the Fishing Vessel Mortgage Insurance Program, also BCF administered, 11 applications for $1,116,837 were received during fourth quarter of 1967. Since program began on July 5, 1960, 186 applications were received for $22,051,879. Of the total, 150 applications were approved for $17,939,124 and 14 applications for $1,997,712 were pending, as of Dec. 31, 1967.

Differential Subsidy

The first applications for a Fishing Vessel Construction Differential Subsidy, under BCF's expanded program, were received in December 1964. Through Dec. 31, 1967, 86 applications for an estimated $20,936,500 in subsidies had been received. Of these, 56 applications were approved for eligibility after Public Hearings.

## BCF to Increase Aid to Retailers in Selling Fishery Products

BCF will increase its efforts to help retailers sell their fishery products. It has arranged to present its techniques of seafood merchandising to the annual convention of the Supermarket Institute at Cleveland in May. BCF will prepare its presentation with technical assistance from the National Fisheries Institute. After the convention BCF will work with local groups.

## Useful Information for Low-Income Groups Prepared

BCF contributed information on fish to a 120-page booklet, "Project Headstart Food Buying Guide And Recipes," recently published by the Office of Economic Opportunity (OEO). OEO has distributed 150,000 copies.

Also, BCF is developing a training kit and slides on the use of fishery products to help groups working with people of low income. This material will be distributed in the second quarter of 1968--with the new BCF publication, "Fish For Compliments On A Budget."

## New Brochure: "Seafoods. . . Everyday Everyway"

BCF has distributed to its marketing field stations a new, full-color, brochure--"Seafoods. . .Everyday Everywhere." The brochure promotes 10 BCF color recipe publications. The Government Printing Office (GPO) has bought an additional 250,000 copies to distribute to its selected mailing list.

The brochure will be given away at marketing meetings and conventions. It will be mailed to news media to publicize availability of the color recipe booklets through GPO--and to increase public knowledge about U. S. fishery products.

## Biologist Talks to Fishermen About Bioliogical Oceanography

Biologist Kenneth Sherman of the BCF Biological Laboratory, Boothbay Harbor, Maine, has been giving a series of talks on biological oceanography and Gulf-of-Maine herring to meetings of Maine State Marine Fisheries Extension Committees. This is the second series given by the laboratory's biologists at these meetings.

The first dealt with observations on lobsters made by SCUBA divers.

The talks, generally well received, are considered a valuable way to acquaint fishermen with BCF programs, goals, and accomplishments.

# Special Small-Clam Retainer and Bottom Sampler Designed

By Lars A. Fahlen* and Phillip S. Parker**

In the survey conducted last year to evaluate the availability of surf clams off New Jersey, Maryland, and Virginia, personnel aboard BCF's exploratory fishing vessel "Delaware" used an experimental dredge with a small-clam retainer (fig. 1). The retainer collects small surf clams, other bottom organisms, and materials that otherwise would pass through the peripheral slots of the dredge.

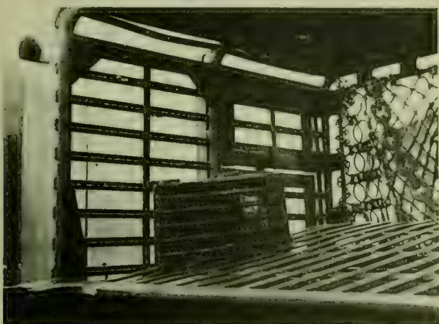


Fig. 1 - Entrance to small-clam retainer mounted in bottom of a surf-clam jet dredge.

The technique used can be utilized by other research agencies. The collecting unit can be fitted on any dredge similar to the sea clam dredge.

## The Retainer or Sampler

The specially constructed retainer or sampler is a triangular-shaped box that has steel rods across the entrance and a collecting bag on the back side. The entrance has $\frac{1}{2}$-inch round steel welded horizontally $1\frac{1}{2}$ inches apart. The rods allow small items that are washed out of the bottom, and those that lie on the bottom, to pass into the sampling unit--but prevent the large materials from passing into the unit. Large materials are retained in the chain bag. The collecting bag is attached to an 8-inch square frame of $\frac{1}{2}$- by $1\frac{1}{4}$-inch angle iron. Size of netting in the sampling bag controls the size of material collected. The frame and bag are easily accessible through a hinged door on the side of the sled cage (fig. 2).

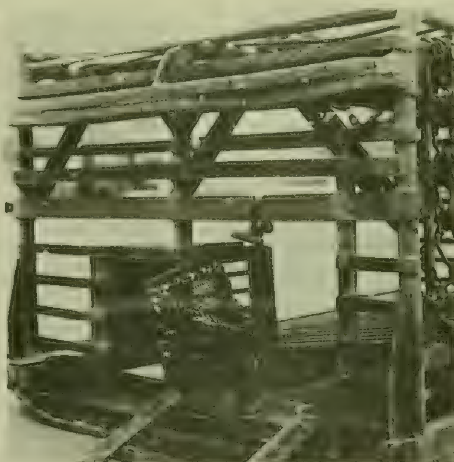


Fig. 2 - Small-clam retainer bag and hinged door in side of jet dredge. Door provides easy access to collecting bag.

The sampler is attached to the inner right side of sled cage and is positioned so that its collecting bag is well forward of the chain bag at rear of cage. As retainer is attached to dredge, small surf clams and small-size materials are taken whenever the experimental dredge is used in normal fishing operations.

*Fishery Methods and Equipment Specialist
**Fishery Biologist
Exploratory Fishing and Gear Research Base, BCF, Gloucester, Mass. 01930
Note: This is Equipment Note No. 23.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 807

# WORLD RAW AND CANNED TUNA SITUATION

By Liaqat Ali*

There is a dearth of comprehensive and reliable data on the world tuna economy[1]--particularly about the disposition of tuna landings in such processed forms as frozen and canned tuna, and the consumption of various types of tuna. Despite these deficiencies, however, Tables 1 to 5 (world raw tuna landings and disposition) and Tables 6 to 10 (canned tuna production and disposition) provide a useful partial picture. These figures ought to be looked at with care. A reconciliation of data in some tables has been found impracticable.

Raw Tuna and Tunalike Fish

From 1956 to 1965, world landings[2] of raw tuna, bonito, and skipjack increased continuously from 1956 to 1963, with the exception of 1960. They rose from 805,000 metric tons to 1.3 million metric tons (Tables 1 and 2)--an increase of 6.6 percent per annum but, in the last two years of the decade, fell by about 4 percent from 1963. Nevertheless, world landings in 1956 to 1965 rose 4.6 percent per annum.

The slight decline in 1960 reflected a 7 percent reduction in Japanese landings and a 15 percent reduction by "other countries" from 1959. But in 1960 these two areas exceeded their 1958 and 1959 landings. The decline in 1964 is accounted for by a decline of 18 percent in Peruvian and 8 percent in "other countries" landings from 1963. In 1965, Peruvian landings declined by 24 percent from 1964, and Japanese landings also fell slightly. On the basis of a least squares regression[3], the upward trend in supplies in 1956 to 1965 was maintained at an annual rate of 4.9 percent. However, between 1958 and 1965 the growth rate slowed, and it rose only 3 percent per year.

Of total landings of tuna and tunalike fish in 1956 and 1957, about 75 percent and 81 percent respectively[4] were used for canned production. Since then, the percentages have varied between 52 and 57. A detailed discussion of the canned tuna situation is given on pages 27-30.

For 1956-65, apparent direct world consumption of raw tuna and tunalike fish has been arrived at in Table 5 by deducting from total landings the net exports of fresh and frozen tuna, and fresh and frozen tuna used for canned-tuna production. The result follows:

| Year | Apparent Raw Consumption (Table 5) Landed Weight |
|---|---|
| | 1,000 Metric Tons |
| 1956 | 276.6 |
| 1957 | 262.5 |
| 1958 | 410.2 |
| 1959 | 474.5 |
| 1960 | 432.4 |
| 1961 | 592.3 |
| 1962 | 554.9 |
| 1963 | 592.2 |
| 1964 | 488.5 |
| 1965 | 441.7 |

It is obvious that there is some serious discrepancy in the figures for 1956, 1957, and 1958.

Japan A Leading Consumer

Based on Table 5 data, most of the apparent world direct consumption of fresh tuna takes place in less-developed countries. In 1956 and 1957, Japan, Turkey, and Peru accounted for over 80 percent of apparent world direct consumption of raw tuna; Japan's share was 57 percent and 66 percent, respectively. In the following years, the share of these three countries in total consumption of raw tuna varied between 65 and 71 percent. Japan still remained the largest single consumer, but its share fluctuated between 44 and 55 percent.

*Economist, Dominion Bureau of Statistics, Ottawa, Canada.

Note: The tuna and tunalike fish in this article include: Albacore, Bigeye Tuna, Bluefin Tuna, Bonitos, Frigate Mackerels, Little Tunas, Skipjack, Yellowfin Tuna, and various tunalike scombriforms.

1/From the beginning of 1956, FAO changed its fishery classification system. Hence the data prior to 1956 are not comparable. "World" excludes the Sino-Soviet Bloc.

2/Over 70 percent of total world landings are accounted for by Japan, U.S.A., and Peru.

3/"Least squares regression" is a mathematical technique to produce the closest approximation of a line that will go through a set of data from the real world. It is used often to extend (project) a line on a chart to arrive at a likely future situation. It is used too to show a past situation.--Ed.

4/There appears to be some discrepancy in either the total landings figures or in the canned tuna production. The latter figures are perhaps slightly more reliable because one would expect processing plants to supply more definite data. However, reconciliation is not possible.

| Table 1 - World Total Landings of Raw Tunas, Bonitos and Skipjacks, 1956-65 1/ | | |
|---|---|---|
| Year | Total Landings | Landed Weight Equivalent Used for Canned Tuna Production 2/ |
| | . . . (Landed Weight, 1,000 Metric Tons) . . . | |
| 1956 | 804.7 | 604.0 |
| 1957 | 811.9 | 656.0 |
| 1958 | 995.0 | 516.0 |
| 1959 | 1,066.5 | 560.0 |
| 1960 | 1,057.1 | 598.0 |
| 1961 | 1,234.0 | 648.0 |
| 1962 | 1,243.1 | 644.0 |
| 1963 | 1,257.6 | 664.0 |
| 1964 | 1,212.0 | 670.0 |
| 1965 | 1,205.0 | 696.0 |

1/Excluding Eastern Europe and China (Mainland).
2/World canned tuna production has been converted to landed weight raw tuna basis by increasing the former (canned production) by 100 percent.
Source: FAO Yearbooks of Fishery Statistics.

| Table 4 - Destination of Exports of Frozen Tuna and Tunalike Fish, 1956-65 1/ | | | | | |
|---|---|---|---|---|---|
| Year | Canada | U.S.A. | E.E.C. | Others | Total |
| | . . . . . . . . . . (1,000 Metric Tons) . . . . . . . . . . | | | | |
| 1956 | 2.2 | 67.3 (69.0) | 13.0 | 3.8 | 86.3 |
| 1957 | 1.0 | 78.5 (86.0) | 11.8 | 11.6 | 102.9 |
| 1958 | 2/ | 99.5 (119.4) | 14.2 | 13.8 | 127.5 |
| 1959 | 1.1 | 109.3 (141.6) | 21.1 | 33.7 | 165.2 |
| 1960 | 1.7 | 102.3 (133.8) | 17.9 | 44.3 | 166.3 |
| 1961 | 1.1 | 95.4 (121.8) | 24.4 | 53.6 | 174.5 |
| 1962 | 1.7 | 108.1 (161.5) | 31.4 | 53.7 | 194.9 |
| 1963 | 1.5 | 94.9 (142.7) | 37.3 | 52.7 | 185.9 |
| 1964 | 1.8 | 128.3 (169.2) | 27.9 | 46.2 | 204.2 |
| 1965 | 2.5 | 116.4 (169.5) | 31.9 | 45.0 | 195.8 |

1/Includes Czechoslovakia, East Germany and Yugoslavia but excludes USSR, Rest of Eastern Europe and China (Mainland).
2/Negligible or insignificant.
Note: U. S. figures in brackets are from U. S. Department of Interior, BCF.
Source: FAO Yearbooks of Fishery Statistics.

| Table 2 - World Landings of Tunas, Bonitos, and Skipjacks, 1956-1965 1/ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
| | . . . . . . . . . (Landed Weight, 1,000 Metric Tons) . . . . . . . . . | | | | | | | | | |
| Africa: | | | | | | | | | | |
| Angola | 10.0 | 10.6 | 10.8 | 14.4 | 8.6 | 8.5 | 9.7 | 8.5 | 7.8 | 8.4 |
| Morocco | 6.0 | 7.0 | 16.2 | 7.1 | 8.9 | 8.1 | 8.5 | 9.8 | 8.8 | 9.6 |
| Tunisia | 1.5 | 1.7 | 1.3 | - | - | - | - | - | - | - |
| North America: | | | | | | | | | | |
| Canada | 0.2 | 0.1 | 2/ | 0.2 | 0.2 | 0.1 | 0.3 | 0.5 | 1.1 | 0.6 |
| Cuba | - | - | - | - | 3.2 | 3.0 | 1.2 | 2.4 | 1.6 | 2.2 |
| Mexico | 0.8 | 0.6 | 2.7 | 4.1 | 3.9 | 3.4 | 4.4 | 4.5 | 4.6 | 4.3 |
| U.S.A. | 161.2 | 146.8 | 159.0 | 141.2 | 145.4 | 165.8 | 155.7 | 164.6 | 161.9 | 172.9 |
| S. America: | | | | | | | | | | |
| Argentina | 2/ | 2/ | 2/ | 1.1 | 2.1 | 1.7 | 1.3 | 2.7 | 2.0 | 1.8 |
| Brazil | - | - | - | 6.4 | 5.5 | 5.5 | 4.7 | 4.3 | 2.6 | - |
| Chile | 5.4 | 2.6 | 4.0 | 2.6 | 2.4 | 3.7 | 2.4 | 2.7 | 6.2 | 11.3 |
| Ecuador | 6.8 | 9.9 | 11.8 | 14.8 | 19.1 | 11.7 | 11.4 | 13.5 | 9.8 | 14.8 |
| Peru | 97.0 | 71.2 | 85.1 | 116.2 | 124.1 | 134.2 | 113.9 | 118.8 | 97.2 | 74.0 |
| Asia: | | | | | | | | | | |
| China (Taiwan) | 16.7 | 17.4 | 19.9 | 21.3 | 17.2 | 23.4 | 32.2 | 28.2 | 32.2 | 26.8 |
| Israel | 0.2 | 0.3 | 0.5 | 0.5 | 0.5 | 0.7 | 1.0 | 0.9 | 1.1 | 1.5 |
| Japan | 356.6 | 397.6 | 455.0 | 518.3 | 483.9 | 593.7 | 641.2 | 614.3 | 607.0 | 592.0 |
| Korea, South | 2/ | 2/ | 2/ | 2/ | 2/ | 2/ | 2/ | 2.8 | 5.4 | - |
| Turkey | 55.5 | 40.7 | 27.6 | 11.1 | 32.5 | 42.1 | 4.0 | 19.2 | 11.2 | - |
| Europe: | | | | | | | | | | |
| France | 17.4 | 25.1 | 28.7 | 22.7 | 31.8 | 30.0 | 34.2 | 38.3 | 40.8 | 35.2 |
| Greece | 3.3 | 5.3 | 1.3 | 0.9 | - | - | - | 3.4 | 3.5 | 3.8 |
| Italy | - | - | 3.4 | 3.3 | 2.6 | 4.2 | 3.1 | 4.0 | 3.7 | 3.4 |
| Portugal | 6.9 | 10.1 | 7.0 | 9.4 | 9.0 | 9.0 | 11.2 | 13.3 | 9.4 | 11.8 |
| Spain | 40.2 | 42.2 | 56.2 | 43.9 | 46.6 | 35.3 | 53.8 | 51.4 | 51.9 | 57.2 |
| Oceania: | | | | | | | | | | |
| Australia | 0.5 | 1.0 | 1.4 | 2.5 | 3.2 | 4.4 | 4.8 | 5.0 | 8.1 | 7.2 |
| Others | 18.4 | 21.7 | 98.1 | 124.5 | 106.4 | 145.5 | 144.1 | 144.5 | 134.0 | 169.0 |
| Total | 804.7 | 811.9 | 995.0 | 1,066.5 | 1,057.1 | 1,234.0 | 1,243.1 | 1,257.6 | 1,212.0 | 1,205.0 |

1/Excluding Eastern Europe and China (Mainland).
2/Negligible or insignificant.
Source: FAO Yearbooks of Fishery Statistics and U. S. Department of Interior, BCF, for U. S. figures.

| Table 3 - Exports of Frozen Tuna and Tunalike Fish, 1956-1965 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
| | . . . . . . . . . (1,000 Metric Tons) . . . . . . . . . | | | | | | | | | |
| Canada | 4.4 | 4.8 | 3.5 | 3.9 | 2.8 | 0.3 | 0.4 | 1.2 | 0.7 | 0.9 |
| Japan | 58.7 | 74.1 | 102.1 | 128.6 | 140.4 | 148.0 | 170.5 | 157.2 | 187.4 | 177.8 |
| Norway | 6.6 | 6.2 | 5.1 | 7.0 | 5.3 | 6.5 | 4.1 | 4.8 | 2.9 | 6.5 |
| Denmark | 2.6 | 3.7 | - | - | - | - | - | - | - | - |
| Sweden | 1.4 | 1.9 | - | - | - | - | - | - | - | - |
| Peru | 12.6 | 12.2 | 16.8 | 25.7 | 117.8 | 19.7 | 19.9 | 22.7 | 13.2 | 10.6 |
| Total | 86.3 | 102.9 | 127.5 | 165.2 | 166.3 | 174.5 | 194.9 | 185.9 | 204.2 | 195.8 |

Source: FAO Yearbooks of Fishery Statistics.

Table 5 - Apparent World Consumption of Raw Tuna and Tunalike Fish, 1956-65[1/]

| Country | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---|---|---|---|---|---|---|---|---|---|---|
| | (Landed Weight, 1,000 Metric Tons[2/]) | | | | | | | | | |
| Portugal | - | - | 1.2 | - | - | - | 0.6 | 1.5 | - | - |
| Spain | - | - | - | 11.9 | 12.2 | 7.5 | 17.8 | 13.4 | 21.5 | 15.0 |
| Japan | 157.9 | 172.3 | 217.3 | 220.1 | 190.6 | 271.9 | 303.3 | 289.5 | 243.8 | 257.6 |
| Turkey | 53.7 | 39.1 | 25.8 | 10.7 | 31.7 | 41.9 | 3.8 | 19.2 | 11.2 | - |
| Morocco | 2.4 | - | 11.2 | 1.7 | 3.1 | 0.9 | - | 9.0 | 2.2 | 1.6 |
| Peru | 33.0 | 9.0 | 33.9 | 82.8 | 59.0 | 108.6 | 58.2 | 89.3 | 80.0 | 35.0 |
| Rest of World[3/] | 29.6 | 42.1 | 120.8 | 147.3 | 135.8 | 161.5 | 171.2 | 170.3 | 129.8 | 132.5 |
| Total | 276.6 | 262.5 | 410.2 | 474.5 | 432.4 | 592.3 | 554.9 | 592.2 | 488.5 | 441.7 |

1/Excluding Eastern Europe and China (Mainland).
2/Apparent world consumption has been arrived at by deducting from total landings the net exports of fresh and frozen tuna, etc. (frozen tuna was converted to landed weight by increasing its weight by 30%) and of tuna, etc., used for canned production (canned tuna was converted to landed weight by increasing it by 100%).
3/Some of the main countries included in this group are: Angola, Mexico, Argentina, Brazil, Chile, Ecuador, and China (Taiwan).
Source: FAO Yearbooks of Fishery Statistics.

Table 6 - World Production and Exports of All Fish in Airtight Containers, 1956-1965[1/]

| Year | Production | | | Exports | | |
|---|---|---|---|---|---|---|
| | Total | Of Which Tuna, Etc. | Tuna, Etc. as % of Total | Total | Of Which Tuna, Etc. | Tuna, Etc. as % of Total |
| | (1,000 Metric Tons) | | | | | |
| 1956 | 1,263.0 | 302.0 | 24 | 368.5 | 56.6 | 15.4 |
| 1957 | 1,287.0 | 328.0 | 25 | 359.2 | 72.6 | 20.2 |
| 1958 | 1,321.0 | 258.0 | 20 | 421.3 | 49.9 | 11.8 |
| 1959 | 1,359.0 | 280.0 | 21 | 457.2 | 61.1 | 13.4 |
| 1960 | 1,466.0 | 299.0 | 20 | 444.9 | 58.6 | 13.1 |
| 1961 | 1,547.0 | 324.0 | 21 | 455.6 | 66.1 | 14.5 |
| 1962 | 1,562.0 | 322.0 | 21 | 465.8 | 65.6 | 14.0 |
| 1963 | 1,517.0 | 332.0 | 22 | 423.3 | 64.7 | 15.3 |
| 1964 | 1,637.0 | 335.0 | 21 | 542.0 | 67.0 | 12.4 |
| 1965 | 1,702 | 348.0 | 20 | 483.0 | 62.0 | 12.8 |

1/Excludes Eastern Europe and China (Mainland).
Source: FAO Yearbooks of Fishery Statistics.

Japan consumed 43 to 47 percent of its total landings, except in 1960 and 1964, when the figure dropped to about 40 percent simultaneously with a drop in landings. Fluctuations in consumption appear to depend on fluctuations in domestic catch. Peru's raw tuna consumption fluctuated between 13 and 82 percent of her total landings. There does not appear to be any stable growth pattern in consumption since 1959. Turkey's landings declined from 54,000 metric tons in 1956 to 11,200 tons in 1965--and with them consumption. It appears that the pattern of raw tuna consumption in major areas largely reflects the availability of domestic supplies, and perhaps traditional eating habits as well. Nevertheless, consumption of raw tuna has increased in Japan from 1956 to 1965 by 5.6 percent per year. These figures should be looked at cautiously, especially in projecting future demand.

Consumption by Rest of World

Apparent direct consumption of raw tuna in the "rest of the world" shows an almost continuous increase from 29,600 tons in 1956 to 170,000 tons in 1963--even after allowing that the data for the early years are probably not homogeneous. But in the following two years, when total landings declined, consumption fell to around 130,000 to 133,000 tons. Assuming greater homogeneity in the available statistics since 1958, the rate of growth through 1963 appears to be 7.1 percent per annum. However, in 1958 to 1965, rate of growth dropped to 1.1 percent per annum. Almost all countries in this group catch their own tuna for domestic direct consumption.

In 1956-1965, least squares regression indicate that direct consumption of raw tuna rose at the rate of about 6.2 percent per year based on Table 5 but, from 1958 to 1965, increased only by about 2 percent per annum.

During 1956-65, most of the world's landings of raw tuna and tunalike fish were consumed within their landing areas. A very small proportion of total landings enters international trade. In recent years, about 10 to 17 percent of total landings was exported in the form of frozen tuna.

5/Some countries included in this group are: Angola, Mexico, Argentina, Brazil, Chile, Ecuador, and China (Taiwan).

### World Exports Rose

World exports of frozen tuna and tunalike fish rose from 86,300 metric tons in 1956 to 204,200 metric tons in 1964 (Table 3)--an 11.3 percent rate per annum. In 1963, however, they declined 4.6 percent from 1962, but this was accounted for by a drop in Japan's total landings. In 1965, they fell 4 percent from 1964, in line with declines in Peruvian and Japanese landings. Based on a least squares regression, the growth rate between 1956-65 was 8.7 percent per annum; in 1958 to 1965, it rose only 5.3 percent per year. This means that the world exports of frozen tuna and tunalike fish in 1956 to 1965, or in 1958 to 1965, rose faster than landings and consumption of raw tuna (Table 5).6/

Among individual exporters of frozen tuna and tunalike fish, Japanese exports accounted for nearly 70 to 92 percent of total world exports. Japan was followed by Peru with 5 to 16 percent. Japanese exports of frozen tuna and tunalike fish increased continuously from 58,700 tons in 1956 to 187,400 tons in 1964--up about 17 percent per annum.7/ But in 1963, exports fell about 7 percent below 1962 and, in 1965, 5 percent below 1964. This was due perhaps to low landings in those years. On the other hand, Peruvian exports of frozen tuna and tunalike fish fluctuated from year to year with no detectable trend. For example, Peru recorded in 1961 its highest landings, but exports of frozen tuna and tunalike fish fell to 19,700 tons. Yet, in 1959, total landings were 116,200 tons, lower than in 1961, and Peru exported 25,700 tons (Tables 2 and 3). On the whole, then, it seems that Japan has maintained a powerful hold over exports of frozen tuna to world markets.

### U. S. and EEC Imports

In recent years, the U. S. and the European Economic Community (EEC), the Common Market, imported nearly 72 to 79 percent of total frozen tuna exports; the U. S. accounted for over 50 percent. However, U. S. imports fluctuated between 67,300 tons and 128,300 tons in 1956-65. Based on a least squares regression, despite wide fluctuations during this period, imports rose at 4.1 percent rate per annum, which is in line with growth in U. S. consumption of canned tuna.8/ But, in 1958 to 1965, U. S. imports rose only at 2.3 percent rate per year (least squares regression). However, it should be borne in mind that U. S. landings (Table 2) have remained fairly stable in recent years. But consumption of canned tuna has been increasing 8/, and this could only be met by imports of frozen tuna. It seems that there is some discrepancy in the figures giving a declining import trend. Alternatively, if BCF figures of U. S. imports (figures in brackets, Table 4) are considered then, based on a least squares regression, the growth in 1956-65 and 1958-65 was 8.3 percent and 4.7 percent per annum. This explains that increased consumption of canned tuna has been met by imports of frozen tuna.

Imports into EEC also fluctuated between 13,000 tons to 37,300 tons per year. On the average, they rose from 13,000 tons per year in 1956-58 to 32,400 tons per year in 1963-65. That is, imports more than doubled.9/ The apparent growth is credible considering that the absolute quantities are modest and at least one EEC country, Italy, expanded canned tuna production at a similar rate in this period. Consumption of canned tuna in EEC as a whole, however, is increasing at only a 4.3 percent rate per annum. Imports into the "rest of the world" have also increased tremendously--from about 9,700 tons in 1956-58 to nearly 48,000 tons in 1963-65. Yet in most recent years, there has hardly been growth in the "rest of the world". Nevertheless, it accounts for about 28 to 30 percent of total world imports (Table 4).

### 1956-65 Landings and Consumption

Principal findings of the raw tuna situation thus far are that landings in 1956-65 rose at 5 percent rate per annum, but growth rate in 1958 to 1965 slowed to 3 percent per year. World consumption of raw tuna in 1956-65 grew at 6.2 percent rate per year based on Table 5. Most of this growth took place in the developing countries. World exports of frozen tuna during 1958-65 rose 5.3 percent per year; growth during 1956-65 was at 8.7 percent rate per year, but the figures for 1956 and 1957 are not entirely satisfactory.

6/Exports of canned tuna barely kept pace with production and consumption of canned tuna and tunalike fish.
7/It appears that Japan expanded its frozen tuna exports at a faster rate than exports of canned tuna (see Table 8).
8/All imports of frozen tuna in the U. S. are used for canning. In the same period canned tuna consumption rose by 3.3 percent per year.
9/In EEC, frozen tuna imports are believed used largely for canning.

### Canned Tuna and Tunalike Fish

In 1956-65, world[10] production of all fish in airtight containers increased continuously from 1.26 million metric tons to 1.70 million metric tons (Table 6)--up about 35 percent, or a compound annual increase rate of 3.4 percent. Production fell by 3 percent in 1963 (Table 6), but it seems more likely that this is due to natural or cyclical reasons (possibly a short catch in Japan or a drawing down of canned tuna inventories) than to a reversal of the implied long-term demand trend.

World production of canned tuna, bonito, etc., accounted for nearly 25 percent of canned fish production in 1956 and 1957, but it has varied since between 20 and 22 percent (Table 6).

During 1956-65, world production of tuna and similar fish in airtight containers fluctuated between 258,000 and about 348,000 tons per year. There was almost no growth between 1957 and 1963. There was, however, a detectable upward trend during the period as a whole. Based on a least squares regression, it seems fair to say that production did grow by about 1.9 percent per annum, or just over half the rate at which total canned fish production has been growing. The sharp decline in 1958 was due to a decline in production in France, Japan, Peru, and Portugal; in the following years, production growth in those countries was very slow.

### U. S. Ate About Half World's Canned Tuna

In 1956-65, over 75 percent of the apparent world canned-tuna consumption was concentrated in EEC, Portugal, Spain, the U.K., the U. S., Japan, and Mexico. The U. S. consumed most--nearly 50 percent of apparent total world consumption (Table 10). Demand trends varied radically among these countries, however. Consumption in Japan has been <u>declining</u> at the rate of about 14 percent per annum; in Spain, at 2 percent per year from 1956 to 1964[11]; and in the U.K., by about 7 percent (Table 10). On the other hand, consumption in EEC has been increasing at 4.3 percent rate, 1956 to 1964[11]; in the U. S., by about 3.3 percent per annum. These conflicting trends indicate the need for extreme caution in assessing future demand for tuna. The comparative growth rates for the U. S. and EEC are roughly consistent with comparative levels and growth rates of per-capita income in these areas. However, the same can hardly be said for the U.K., Japan, and Spain. Possibly changes in eating habits in specific countries are as important, if not more so, in determining the demand trend for canned tuna as are the level and trend of per-capita income.

Consumption in the rest of the world appears to have fluctuated with movements in supplies.[12] In 1957 and 1965, when world production of canned tuna was at its highest, consumption in the "rest of the world"[13] reached very high levels. In the intervening years, however, the apparent consumption declined when the supply situation became tighter.

Most of the world's production of all canned fish, and of canned tuna in particular, appears to be consumed within the producing countries. However, a substantial proportion does enter international trade channels. In recent years, $\frac{1}{4}$ and $\frac{1}{3}$ of world production of canned fish has been exported. Similarly, around $\frac{1}{5}$ of world canned-tuna production has gone into export channels. Tuna has accounted for only 12 to 15 percent of world exports of all canned fish, except in 1957, when the proportion reached a high of 20 percent.

### Exports Fluctuate

While world production of all canned fish and canned tuna has tended to increase more or less steadily since 1956, exports have tended to fluctuate rather frequently and quite widely, especially of tuna. Consequently, it is extremely difficult to determine what the trade trend has been. For canned fish as a whole, there undoubtedly was a strong upward trend in export trade between 1956 and 1964, despite downward fluctuations in 1957, 1960, 1963, and 1965. Such exports increased from 368,500 tons to 542,000 tons (Table 6)--up about 47 percent, an average compound rate of 5 percent per year. Exports in 1963 and 1964, however, declined by about 9 percent from 1962 and 1964, respectively. For canned tuna and tunalike fish, the secular trend of world export trade is even more obscure because of extremely wide gyrations early in the period, when an increase of 28 percent in 1957 was followed by a fall of 30 percent in 1958, and another rise of 20 percent in 1959 (all changes measured with respect to level of preceding year). The analysis of exports by destination in Table 9 indicates that these fluctuations may have reflected partly demand factors (see EEC

10/"World" excludes the Sino-Soviet bloc.

11/The increase in apparent consumption in Spain and a drop in EEC consumption in 1965 over 1964 (Table 10) appears due to fortuitous circumstances rather than any change in long-term trend.

12/Consumption is believed to be price elastic, but lack of data on prices prevents any price analysis.

13/Among the principal countries in this category are Argentina, Canada, China (Taiwan) and Australia.

Table 7 - Production by Countries of Tunas, Bonitos, and Skipjacks, in Airtight Containers, 1956-1965 1/

| | 1956 2/ | 1957 2/ | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1,000 Metric Tons) | | | | | | | | | |
| Africa: | | | | | | | | | | |
| Angola | 1.2 | 1.5 | - | - | - | - | - | - | - | - |
| Morocco | 1.8 | 5.5 | 2.5 | 2.7 | 2.9 | 3.6 | 4.9 | 2.6 | 3.3 | 4.0 |
| Tunisia | 0.9 | 0.6 | 0.4 | - | - | - | - | - | - | - |
| North America: | | | | | | | | | | |
| Canada | 1.0 | 0.2 | 0.1 | 1.1 | 0.9 | 0.5 | 1.4 | 1.0 | 2.6 | - |
| Cuba | - | 0.4 | 0.3 | 0.6 | - | 1.7 | 0.9 | 0.7 | 0.3 | 0.5 |
| Mexico | 0.3 | - | 0.4 | 0.6 | 0.7 | 2.5 | 1.5 | 1.9 | 7.0 | 6.8 |
| United States | 112.9 | 113.8 | 122.9 | 124.6 | 132.7 | 141.9 | 152.5 | 148.8 | 158.9 | 162.7 |
| South America: | | | | | | | | | | |
| Argentina | 4.1 | 9.1 | - | 1.2 | 2.2 | 1.1 | 0.7 | 2.4 | 0.9 | 1.2 |
| Brazil | - | - | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | - | 0.2 | 0.2 |
| Chile | 1.7 | 1.3 | 0.9 | 0.8 | 0.3 | 1.4 | 1.0 | 0.8 | 1.8 | 1.6 |
| Ecuador | - | 0.4 | 0.9 | 1.2 | 1.6 | 3.7 | 2.3 | 2.8 | 3.4 | 3.3 |
| Peru | 23.8 | 23.8 | 14.7 | - | 21.0 | - | 14.9 | 19.0 | - | 12.7 |
| Asia: | | | | | | | | | | |
| China (Taiwan) | 0.3 | 0.9 | 0.7 | 0.4 | 0.7 | 1.2 | 1.5 | 2.8 | 3.6 | 2.1 |
| Israel | - | - | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.5 |
| Japan | 61.2 | 64.5 | 52.5 | 65.5 | 55.4 | 64.7 | 58.1 | 60.2 | 59.8 | 52.1 |
| Korea, South | 4.2 | 5.4 | 3/ | 3/ | 4.3 | 5.2 | 0.3 | 0.1 | - | 0.1 |
| Turkey | 0.9 | 0.8 | 0.9 | 0.2 | 0.4 | 0.1 | 0.1 | - | - | - |
| Europe: | | | | | | | | | | |
| France | 4/29.4 | 4/44.6 | 19.3 | 22.4 | 21.4 | 21.0 | 22.0 | 23.0 | 23.3 | - |
| Greece | 0.7 | 1.2 | 1.2 | 1.0 | - | 1.0 | 1.0 | 0.8 | 0.8 | 0.8 |
| Italy | 13.0 | 12.0 | 15.0 | 15.0 | 28.0 | 32.0 | 33.2 | 39.2 | 35.5 | 42.0 |
| Portugal | 9.7 | 10.6 | 2.9 | 4.5 | 5.2 | 4.3 | 5.3 | 5.9 | 5.7 | 7.3 |
| Spain | 21.6 | 21.4 | 21.1 | 16.0 | 17.2 | 13.9 | 18.0 | 15.9 | 15.2 | 21.1 |
| Oceania: | | | | | | | | | | |
| Australia | 0.8 | 1.5 | 0.5 | 0.7 | 0.9 | 1.4 | 1.7 | 1.9 | 2.1 | 2.5 |
| Others | 12.5 | 8.5 | 0.6 | 21.2 | 2.8 | 22.4 | 0.4 | 2.0 | 10.2 | 26.5 |
| Total | 302.0 | 328.0 | 258.0 | 280.0 | 299.0 | 324.0 | 322.0 | 332.0 | 335.0 | 348.0 |

1/Excludes Eastern Europe and China (Mainland).
2/Tunas, Bonitos, Mackerels, Etc., in airtight containers.
3/Negligible or insignificant.
4/Includes Algeria.
Source: FAO Yearbooks of Fishery Statistics.

Table 8 - Breakdown of World Exports of Canned Tuna and Tunalike Fish, 1956-65 1/

| Year | Morocco | United States | Peru | Japan | France | Portugal | Spain | Norway | Total |
|---|---|---|---|---|---|---|---|---|---|
| | (1,000 Metric Tons) | | | | | | | | |
| 1956 | 1.5 | 1.2 | 16.1 | 25.8 | - | 7.6 | 3.1 | 1.3 | 56.6 |
| 1957 | 2.3 | 7.9 | 15.5 | 33.7 | - | 9.3 | 3.4 | 0.5 | 72.6 |
| 1958 | 2.5 | 0.1 | 13.3 | 29.1 | - | 2.3 | 2.6 | - | 49.9 |
| 1959 | 2.7 | 0.1 | 17.3 | 33.1 | - | 3.9 | 4.0 | - | 61.1 |
| 1960 | 2.9 | 0.2 | 15.1 | 32.4 | - | 3.4 | 4.6 | - | 58.6 |
| 1961 | 3.6 | 0.1 | 18.9 | 35.5 | 1.3 | 3.2 | 3.5 | - | 66.1 |
| 1962 | 4.9 | 0.2 | 13.3 | 38.6 | 1.1 | 3.7 | 3.8 | - | 65.6 |
| 1963 | 2.6 | 0.1 | 12.9 | 40.2 | 0.9 | 4.0 | 4.0 | - | 64.7 |
| 1964 | 3.3 | - | 15.1 | 43.9 | 0.5 | 2.3 | 2.3 | - | 67.4 |
| 1965 | 1.6 | - | 10.6 | 42.9 | 0.5 | 3.6 | 2.3 | - | 61.5 |

1/Excludes Eastern Europe and Mainland China; 1956 and 1957 include mackerel instead of skipjack.
Source: FAO Yearbooks of Fishery Statistics.

Table 9 - Destination of World Exports of Canned Tuna and Tunalike Fish, 1956-65 1/

| Year | E.E.C. | U.S.A. | U.K. | Rest of World | Total |
|---|---|---|---|---|---|
| | (1,000 Metric Tons) | | | | |
| 1956 | 12.7 | 26.2 | 6.0 | 12.0 | 56.9 |
| 1957 | 14.6 | 30.6 | 4.0 | 22.0 | 71.2 |
| 1958 | 8.3 | 26.0 | 2.8 | 12.7 | 49.8 |
| 1959 | 12.6 | 27.4 | 2.4 | 18.7 | 61.1 |
| 1960 | 15.6 | 25.1 | 2.1 | 15.8 | 58.6 |
| 1961 | 14.0 | 27.3 | 3.4 | 21.4 | 66.1 |
| 1962 | 17.3 | 26.2 | 2.7 | 19.4 | 65.6 |
| 1963 | 15.1 | 25.0 | 3.4 | 21.2 | 64.7 |
| 1964 | 18.6 | 23.6 | 3.9 | 21.3 | 67.4 |
| 1965 | 18.2 | 21.9 | 3.1 | 18.2 | 61.5 |

1/Excludes Eastern Europe and Mainland China.
Source: FAO Yearbooks of Fishery Statistics.

and USA) and partly supply factors (see imports into "rest of world"). If due allowance is made for the distorting effects of the violent fluctuations of the late 1950's, it is apparent that growth has been taking place in world exports of tuna. It is difficult to measure the precise trend but it could be 0.9 percent per year (taking account either of terminal years 1956 and 1965, and 1.1 percent per annum measuring from 1956-58 to 1963-65), or 1.0 percent per year (based on least squares regression). This would mean that world trade in canned tuna has just about kept pace with growth in world production and consumption.

| Table 10 - Apparent World Consumption of Canned Tuna and Tunalike Fish, 1956-65 1/ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | E.E.C. | Portugal | Spain | U.K. | U.S.A. | Japan | Morocco | Rest of World | Total |
| | (1,000 Metric Tons) | | | | | | | | |
| 1956 | 55.1 | 2.1 | 18.5 | 6.0 | 137.9 | 35.4 | 0.3 | 47.0 | 302.3 |
| 1957 | 71.2 | 1.3 | 18.0 | 4.0 | 136.5 | 30.8 | 3.2 | 61.6 | 326.6 |
| 1958 | 42.6 | 0.6 | 18.5 | 2.8 | 148.8 | 23.4 | 0 | 21.2 | 257.9 |
| 1959 | 50.0 | 0.6 | 12.0 | 2.4 | 151.9 | 32.4 | 0 | 30.7 | 280.0 |
| 1960 | 65.0 | 1.8 | 12.6 | 2.1 | 157.6 | 23.0 | 0 | 36.9 | 299.0 |
| 1961 | 65.7 | 1.1 | 10.4 | 3.4 | 169.1 | 29.2 | 0 | 45.1 | 324.0 |
| 1962 | 71.4 | 1.6 | 14.2 | 2.7 | 178.5 | 19.5 | 0 | 34.1 | 322.0 |
| 1963 | 76.4 | 1.9 | 11.9 | 3.4 | 175.7 | 20.0 | 0 | 44.7 | 332.0 |
| 1964 | 76.9 | 3.4 | 12.9 | 3.9 | 182.5 | 15.9 | 0 | 39.5 | 335.0 |
| 1965 | 59.7 | 3.7 | 18.8 | 3.1 | 184.6 | 9.2 | 2.4 | 69.5 | 348.0 |

1/Excludes Eastern Europe and China (Mainland).
Source: FAO Yearbook of Fishery Statistics.

| Table 11 - Annual Weighted Average Price of All Types of Raw Tuna Ex-Vessel (California), 1956-65 | | |
|---|---|---|
| Year | Dollars Per Ton | |
| | | Deflated Price 1/ |
| 1956 | 262 | 274 |
| 1957 | 257 | 261 |
| 1958 | 268 | 268 |
| 1959 | 255 | 255 |
| 1960 | 248 | 248 |
| 1961 | 264 | 264 |
| 1962 | 289 | 289 |
| 1963 | 251 | 252 |
| 1964 | 255 | 255 |
| 1965 | 264 | 259 |

1/Deflated by the U. S. Wholesale Price Index, 1964=100.
Source: U. S. Department of Interior, BCF.

| Table 12 - U. S. Wholesale Price of Canned Tuna, 1956-65 | | | | |
|---|---|---|---|---|
| Year | Domestic Canned Tuna Price | | Imported Canned Tuna Price 2/ | |
| | | Deflated Price 1/ | | Deflated Price 1/ |
| | (Dollars Per Ton) | | | |
| 1956 | 1,103 | 1,152 | n.a. | - |
| 1957 | 1,127 | 1,144 | n.a. | - |
| 1958 | 1,163 | 1,164 | n.a. | - |
| 1959 | 1,087 | 1,086 | n.a. | - |
| 1960 | 1,102 | 1,100 | 883 | 881 |
| 1961 | 1,129 | 1,131 | 937 | 939 |
| 1962 | 1,202 | 1,201 | 1,009 | 1,008 |
| 1963 | 1,127 | 1,129 | 1,014 | 1,016 |
| 1964 | 1,381 | 1,381 | 1,238 | 1,238 |
| 1965 | 1,385 | 1,358 | 1,201 | 1,071 |

1/Deflated by the U. S. Wholesale Price Index, 1964= 100.
2/Mostly Japanese tuna in brine.
Source: U. S. Department of Interior, BCF.

## U. S. Exports Virtually Nothing

Among individual exporters, U. S. exports declined from a high during the period of 7,900 tons in 1957 to virtually nothing in recent years, while some other major exporters, such as Peru, Portugal, and Spain, have shown stagnating or declining trends (Table 8). Japan is the only exporter to improve its position. Exports rose from 27-32 thousand tons early in the period to 40-42 thousand tons in recent years. In effect, Japan has not only preempted virtually all growth in the world export market since 1959, but she has also cut into its competitors' markets.

EEC, the U. S., and the U.K. imported just over 75 percent of total world imports (Table 9). Imports into U.K. have declined by about 45 percent from 1956, undoubtedly reflecting decline in demand. In the U. S., imports barely remained level despite growth in consumption. The growth in U. S. demand has been fed primarily through increased domestic production of canned tuna from imports of frozen tuna. Only in the "rest of the world" and in EEC have imports benefited from growing demand. In EEC, imports increased by 5,300 tons per year--from an average 12,000 tons per year in 1956-58 to 17,300 tons per year in 1963-65 (a 4.7 percent growth rate per year) while consumption grew by almost 15,000 tons per year (from 56,300 tons to 71,000 tons). Most growth in imports has been in the "rest of the world", which absorbs only about 25 to 30 percent of total exports (Tables 9 and 10).

Price data for tuna are extremely scarce and the reliability of some series is questionable. During 1956-65, annual weighted average price of all types of raw tuna, exvessel California, in real terms (deflated by U. S. Wholesale Price Index 1964 = 100), fluctuated between a minimum and maximum of $248 to $289. The decade average was $263. The real price of canned tuna in the U. S. similarly has shown no decided trend; it has averaged $1,185 per ton.

## CONCLUSION

On the whole, it appears that world landings of raw tuna and tunalike fish are likely to grow, but most of the growth is likely to take place in areas other than the U. S. In fact, U. S. landings in 1956-65 have risen by less than 1.2 percent per annum based on a least squares regression; in most recent years, they have stagnated.

Domestic consumption of raw tuna apparently is concentrated in less developed areas, except in Japan, and depends on domestic catch; that is, it is not supplied by international trade.

Some countries, EEC, Canada, and the U.S., for example, depend on frozen tuna for all or part of their canned production. This has resulted in increasing international trade in frozen tuna. However, it is not clear whether trend of this trade has been 8.7 percent per year (1956-65) or 5.3 percent per year (1958-65). The latter should not be ignored since it represents more recent years. Japan has the lion's share of the export trade; she is not expected to lose her lead. Since demand for canned tuna in frozen-tuna-importing countries is increasing at 4.3 percent rate per annum in EEC, and 3.3 percent in the U. S., long-term rate of growth in demand for frozen tuna is likely to go no higher.

Consumption of canned tuna is rising only in the U. S. and EEC. However, there has been a tendency in these areas to meet domestic consumption needs from processing of frozen tuna, rather than by increased imports of canned tuna. This is reflected in very slow growth of canned tuna exports--0.9 percent per annum in 1956 to 1965, and 1.1 percent from 1956-58 to 1963-65, or 1.0 percent per year based on least squares regression.

Note: I am greatly indebted to W. H. Stolting of BCF for valuable comments on an earlier draft of the paper, and to M. M. Miller of BCF for assistance in collection and classification of data. No one (including my employer) is responsible for either the opinions expressed or possible errors and omissions.


## TUNA CHEESIES

- 1 can (6-1/2 or 7 ounces) tuna
- 1 cup shredded cheese
- 1/4 cup butter or margarine, softened
- 2 tablespoons lemon juice
- 1-1/3 tablespoons grated onion
- 1 teaspoon Worcestershire sauce
- 1/2 teaspoon paprika
- 3 drops liquid hot pepper
- 30 melba toast rounds

Drain and flake tuna. Cream the cheese and butter. Add seasonings and tuna. Mix thoroughly. Spread each toast round with approximately 2 teaspoonfuls of tuna mixture. Place on a baking pan, 15 by 10 by 1 inch. Broil about 4 inches from source of heat for 3 to 5 minutes or until lightly browned. Makes approximately 30 canapes.

This idea for entertaining is from a 22-page, full-color booklet, "Nautical Notions for Nibbling," by the United States Department of the Interior's Bureau of Commercial Fisheries. It is available for 45 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10 (catalog no. I-49.49/2:10).

# TWO LEGS OF "OCEANOGRAPHER'S" GLOBAL CRUISE

By Dr. Timothy Joyner* and Robert C. Clark**

On Dec. 11, 1967, the globe-circling U. S. oceanographic survey vessel "Oceanographer" returned to her home port of Seattle, Wash., after an 8-month, 37,000-mile scientific expedition. Representatives of 17 foreign nations participated. The 303-foot, 3,800-ton, gleaming white "floating laboratory" belongs to the U. S. Coast and Geodetic Survey.

The authors, oceanographers, represented BCF on two legs of the cruise. As geochemists, their primary mission was to evaluate the chemical properties of the water masses in the Tasman Sea and the Southern Pacific Ocean. A secondary mission was to investigate the survival of Pacific salmon transplanted experimentally to the Southern Hemisphere in the early years of this century by the old Bureau of Fisheries, a precursor of the present Bureau of Commercial Fisheries.

Below are parts of the report on their trip, which ran from Sept. 10-Nov. 14--Ed.

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We flew to Sydney to join the Oceanographer. A highlight of our stay in Sydney was a visit to the Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Organization, in Cronulla, a suburb. The staff was gracious. Brian Newell, a marine chemist specializing in nutrient chemistry, briefed us on the history of fishery development in Australia:

Trawl Fisheries: These began in southeastern waters about 1915, the year following government-sponsored exploratory fishing. Years of high production were followed by a sharp decline. Steam trawlers were taken out of service in 1958-59. The fishery is currently stabilized at a low level of production; otter and Danish seine trawling predominate.

Tuna Fishery: In 1937, a cannery was established in Narooma, New South Wales, to exploit the occurrence of southern bluefin revealed by aerial surveys. The landings were insignificant. The actual development of the Australian tuna fishery followed the visit of 2 American tuna experts in 1954. In 1965, the use of gill nets, long lines and purse seines was introduced.

Crayfish: For many decades this was a small-scale operation centered on the southeast coast. In 1944, the western coast began to develop into what has since become Australia's most productive single fishery. The U. S. market for frozen crayfish developed in 1948-1953. The years 1954-62 saw the introduction of more powerful vessels, conservation methods designed to maximize the sustained yield, and better processing facilities.

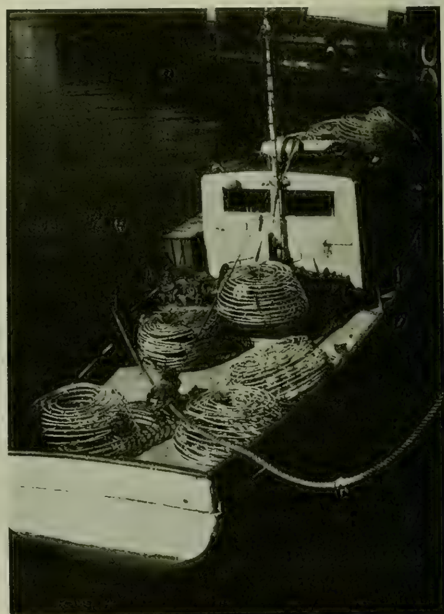


Fig. 1 - Cray fishing vessel with Maori-type pots in Wellington, New Zealand.

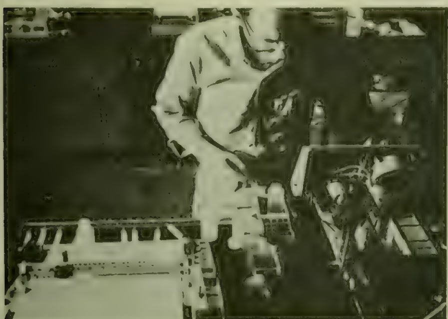
*Project Leader, Marine Geochemistry Project, BCF Biological Laboratory, Seattle, Wash. 98102.
**Oceanographer, BCF Biological Laboratory, Seattle, Wash. 98102.

Prawns: In 1947, deep-sea prawning started off the east coast of New South Wales. The fishery is based on off-shore spawning. Since 1962, an extensive prawn fishery has developed off Western Australia.

Molluscs: Oysters (Crassostrea commercialis) are produced in all states except South Australia. In the estuaries of New South Wales and, to a lesser extent, Queensland, oyster culture is being developed. Oyster production has not kept pace with domestic demand, and imports are still necessary. In the Botany Bay estuaries, where raft culture of oysters is being developed, the range of water temperatures is from $24^{\circ}$ C. in the summer to $16^{\circ}$ C. in the winter.

Sydney to Wellington

Our objective for this leg of the cruise was to evaluate the chemical properties of the water masses contributing to the circulation patterns of the Tasman Sea. Instrumentation, reagents, and laboratory ware were installed in the ship's oceanographic laboratory to provide capability for the following kinds of chemical processing and analysis at sea: Atomic absorption and emission flame photometry for analysis of alkai and alkaline earth elements; Spectrophotometric analysis of Cu, Zn, Fe and carbohydrates; pH measurement; Selective preconcentration of heavy-metal trace elements from sea water.



Figs. 2A & 2B - BCF geochemistry on OSS Oceanographer.

Shipboard facilities and the cooperation of the scientific staff, officers, and crew were excellent.

Sampling data, preconcentration processing and analyses were performed at sea. Heavy-metal concentrates were returned to Seattle for analysis.

In Wellington, we had the good fortune to contact Ron Little, Supervisory Fishery Scientist for the Marine Department. He is a Californian, a former BCF employee, and is in charge of his department's current effort to evaluate the extent of the Quinnat (chinook) salmon resource on South Island. These fish were planted in New Zealand near the turn of the century from eggs of Sacramento River (California) chinook stock. These fish have survived in a number of streams and rivers of the southeastern, southern, and southwestern coasts of South Island. The government has built a fish trap on the Glenariffe tributary of the Rakaia River to evaluate the extent of the incoming and outgoing migrations. At present, virtually nothing is known of the populations of Quinnat salmon in New Zealand streams.

The Glenariffe trap is located in the foothills of the eastern slopes of the Southern Alps, about 80 miles from Christchurch, South Island.

Fig. 3 - Salmon trap in Rakaia River, South Island, New Zealand.

The bed of the river is a maze of braided channels which continually shift, creating serious hazards for egg survival. Spring flooding and predation by birds are additional obstacles to survival of the newly hatched fry. The returning adults appear to be predominantly 3-year-olds and average 6-10 pounds in weight. The young migrate early, at about 3 months, when they are only a few inches long. Little is known of their ocean behavior. There is a convergence of tropical with cold water off the east coast of South Island, so it is likely that their ocean movements are confined to the Southern Shelf region. Ron Little is anxious to try some additional transplanting experiments and may ask BCF for a shipment of chinook eggs in 1968. The relations between the Marine Department and sports fishing interests are not always as cordial as they might be. There has been a surprising amount of opposition by sportsmen to any sort of government control over the salmon stocks.

Wellington to Valparaiso

This leg of the cruise was primarily geological--with emphasis on elucidation of various characteristics of the sea bottom-topography, strength of materials, sedimentology, minerology, and gravitational and magnetic phenomena.

The chemical analyses of sea water begun on the Sydney-Wellington leg were continued.

With the assistance of the superb facilities of the ship's oceanographic laboratory, we were able to collect, process, and analyze samples almost continuously along the entire track from Australia to Chile. The cruise demonstrated the feasibility of operating an integrated instrumental system for elemental analysis of sea water aboard ship. We were able to optimize the precision, range, and sensitivity of our analyses by choosing, for a given set of analytical conditions, the most applicable of the techniques of molecular absorption, flame emission, and atomic absorption spectrophometry.

Working alongside the geologists on the Wellington-Valparaiso leg gave us the opportunity to become acquainted with their techniques. The experience suggested possible adaptations of these techniques to provide information useful in assessing water mass and (possibly) fish distribution in the North Pacific. Closely contoured maps of bottom topography and geomorphology, prepared with the help of high-resolution echo sounding, should be most helpful in predicting flow patterns along the floor of the shelf areas. Coring techniques could be adapted to study distribution and relative age of hard parts of fish found in the upper sediment layers. This would prove useful in working out the history of the geographic distribution of fish populations (as in the case of the California sardine).

Supplementary Work

In addition to our oceanographic work during the cruise, the time spent in Australia, New Zealand, and Chile gave us the opportunity to do two other things: We extended our investigations to include terrestrial and coastal waters in which both mixing and separation processes bring about the distinctive chemistry that constitutes a significant feature of the near-shore environment. And, to a limited extent, we communicated with fishery officials and observed some facets of fishery-based activities.

Chile

The Division of Fisheries of the Chilean Ministry of Agriculture had assigned Senora Irma Vila, P., a biologist, to assist us as a guide, interpreter, and informant. Arrangements were made for us to visit and obtain water samples from the Strait of Magellan, the shellfish culture stations on the Island of Chiloe in the Gulf of Ancud, and Lake Llanquihue near Puerto Montt.

Water From Strait of Magellan

On November 2, accompanied by Senora Vila, we were flown by Lan-Chile Airlines to Punta Arenas, a clean, busy, free-port city of 35,000 at the southern tip of South America on the Strait of Magellan (53°S). Comfortable accommodations were provided at a "hosteria" maintained by the Ministry of Agriculture several miles outside the city. We obtained and processed a sample of water from the Strait of Magellan from a beach across the road from the hosteria.

Fig. 4 - Strait of Magellan--obtaining a water sample.

Before leaving Punta Arenas, we visited Senor Guillermo Roehrs, president of the sport fishing club, owner of a hardware and fishing tackle shop, a long-time resident, and a fishing enthusiast. He is well known and respected by Chilean fish and game authorities and appeared to be familiar with the taxonomy of the sport fishes of the area, including the salmonids. He assured us that the fish called salmon by the local sportsmen were not of the genus Onchorhyncus--but were sea-run trout Salvelinus fontenalis and Salmo trutta, the former commonly reaching 10 kilos. These sea-run trout have silvery scales and bright red flesh and are eagerly sought by sportsmen. These trout are caught in substantial numbers in Seno Otway and Seno Skyring, two wide fjords with narrow openings to the Pacific Ocean and interconnected by a narrow channel. Local maps show that many small, year-round streams flow into these protected, salt-water inlets, which appear to be well suited as an environment for salmonid fishes. The sea temperatures range from 6°-12° C. year round.

Fig. 5 - Fish market at Angelmo, Chile. Dried fish, sea-urchins, clams, abalone, conger eel, dried mussels.

We left Punta Arenas on November 3 for Puerto Montt. On November 4, we visited the fish market at Angelmo, the fishing and shipping port for Puerto Montt. We were struck by the predominance of shellfish in the fish market. Several kinds of mussels, smoked and hung on strings, were evident everywhere in large numbers. Also displayed were clams, oysters, huge barnacles, abalones, and sea urchins. Most of the fish displayed (eels, mackerel, and groundfish) were caught by handline fishermen working from oar-propelled open boats close inshore. There were very few motorized fishing vessels evident. A large number of small sailboats, 15 to 75 feet long, were beached at low tide, some had auxiliary power. They are not generally used for fishing but for carrying cargo to the island of Chiloe, a few miles across the gulf. We saw women gathering kelp at low tide and were told that it is sold and used for food. There is little transport and storage of fishery products of this region; most is sold fresh or smoked in local markets.

On November 5, we traveled by bus and ferry to Castro, on the island of Chiloe, where we obtained a water sample at the head of the Fiordo Castro which opens into the Gulf of Ancud.

Oyster Culture at Pullinque

On November 6, we traveled by bus to Ancud, at the northern end of Chiloe. Here we were met by a boat from the oyster-culture station at Pullinque, in the Golfito (Little Gulf) de Quetalmahue, about 10 kilometers by water from Ancud. This station encompasses farm buildings and waterfront acreage with a small boat pier; it appears to be a model of progressive, scientific management. The barn has been converted into a well-equipped wood-working and machine shop. There is a power plant, a small laboratory building containing diving gear and a wet-lab, and a residence.

In the culture operation, mussel shells are strung on strings, spaced about 6" apart with spacers of polyethylene tubing. These strings are suspended from rails fastened horizontally to stakes which are pounded into the shallow bottom of the bay. The spat attach to the mussel shells, especially to the concave side which faces downward, and are thus protected from sedimentary fallout by the "umbrella" action of the mussel shell. Dr. Sergio Basulto d.C., Chief, Section of Biological Studies of the Division of Fisheries, has studied oyster culture in Aomori, Japan. The methods used at

Fig. 6 - Oyster culture at Pullinque, Island of Chiloe, Chile.

Pullinque are based on Japanese techniques modified for conditions in Chile. The temperature of the water in the Golfito de Quetalmahue was 14.2° C. when we took our sample there. The annual range is narrow, as the climate is quite uniform. Salinity at the oyster station averages about 26-27 with a range of 20-29 parts per thousand. The oysters, classified Ostrea chilensis, tasted somewhat strong, similar to Australian rock oysters. The government makes seed available to private individuals to encourage development of private oyster farms. We were told that it is the same with the mussel culture (in which Spanish techniques are being used).

We went to Puerto Montt on November 7. We took a short bus ride to Puerto Varas on Lake Llanquihue, where we obtained a water sample. The lake collects drainage from the western slopes of the Andes. It is the largest and southernmost in Chile's famed Lake District.

Salmon Eggs from U. S.

On November 8, we went to the Rio Blanco Fish Hatchery, Chile's oldest (1905), about 80 km. from Santiago, 9,000 feet up in the Andes, and not far from Portillo. It was at this hatchery that the salmon eggs transported from the United States early in the century were hatched. The hatchery is one of four in the country. It is used principally for the culture of brown trout, which are planted in lakes to stimulate the sport fishery. Rio Blanco, in a beautiful setting similar to the High Sierras of California, is a clean and well-run hatchery. The troughs and concrete ponds are scrubbed, the egg baskets well picked, and the trout food is well prepared and nicely pelletized. It appears to be very well managed.

Fig. 7 - Earthern rearing pond, Rio Blanco hatchery, Chile.

Observations on Visit to Chile

1. There do not seem to be any Pacific salmon surviving in Chile from early-century transplant experiments. However, the southern third of the country (Aysen and Magallanes) should have potential as a favorable environment for the culture of salmonid fishes, including Pacific salmon.

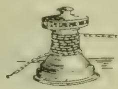
2. The Centolla crab industry of southern Chile appears to be capable of sustaining an enlarged fishery. Exploratory fishing investigations are sorely needed to define the magnitude and extent of this resource. The present fleet of boats engaged in this fishery is inadequate for anything more than marginal operations close inshore and in favorable weather.

3. The deeply indented coastline of Aysen and Magallanes is washed by the cold, nutrient-rich waters of the Humboldt current. It would appear well-suited for shellfish culture, pisciculture, and small-boat, inshore fisheries. However, lack of adequate transport, shore facilities, local markets and, above all, of people oriented toward the sea and maritime

trades, impose severe restrictions on developing these potential marine resources.

4. The culture of trout as game fish is a well-established, well-managed, successful operation. Four trout hatcheries are operated by the government for stocking lakes and streams in the central part of the country. There seems to be a good measure of rapport between the sports fishing organizations and the Ministry of Agriculture's Division of Fisheries.

Dr. Basulto is now eager to undertake an attempt to transplant Pacific salmon to the Aysen-Magallanes region. The Division of Fisheries is particularly interested in sending some scientists and technicians to the U. S. Pacific Northwest for observation and training in salmon culture techniques. The Division also is interested in getting the assistance of some American salmon hatchery men for locating and planning their transplant experiments.



UNDERSEA WARFARE

Underwater gadgets of the future should resist attack by sea organisms better than their predecessors. Thanks to research stimulated by the rapid growth of oceanography, the marine biological environment is now beginning to be understood. Laying the first trans-Atlantic telephone cable in 1956 highlighted the need to develop better ways to prevent undersea damage. Since then, extensive testing of sample materials to be used in underwater marine applications has continued. Results appear in materials now used for recently established submarine listening and tracking stations, and work on long-term protection of marine equipment will continue as more massive underwater equipment is installed.

Early submarine cables were insulated with gutta percha, a natural rubber-like substance, and then covered with hemp, but mollusks and borers were quite successful in destroying them. Mollusks and crustaceans are the most destructive of marine organisms. The 1956 cable has a barrier of copper sheeting wound helically around its internal structure. The latest cables, however, are insulated and covered with polyethylene, which resists most of the marine borers even more effectively, and outer coverings are now black, so as not to attract fish that often bite through light-colored cables.

Fouling is another severe problem. Underwater equipment, particularly that used for communications, must remain reasonably clean in order to operate efficiently, but once a surface is wet, micro-organisms produce a slimy film on it, and very soon afterwards macro-organisms such as barnacles attach themselves to the slime. Protective paints have been developed, and some of them are quite effective in warding off micro-organisms. Effectiveness is related to surface texture, wetting characteristics and stability of the material, relative movement of water around it, and amount of light available; micro-organisms grow faster in warm, lighted water than in cooler deeps.

Compounds of copper, mercury and arsenic that are toxic to fouling organisms have been successfully incorporated in paints for use on hulls. But now that plastics and fibrous glass have become popular in boat hulls, particularly in pleasure craft, there is need for anti-fouling compounds that can be mixed with them to produce a similar effect. Another technique to prevent fouling has been developed recently; it involves pumping a solution of the toxic substance from perforated pipe-lines attached to the underwater area of the ship or structure to be protected. In some cases, this system is used in conjunction with cathodic protection, an electrical anti-fouling procedure which has already proved effective.

Thanks to recent developments, underwater military programs now have a wide range of new and improved materials available. For example, a deep-water basin in the Bahamas, called the Tongue of the Ocean, was chosen as the site for a manned submarine weapons evaluation center; planning for this Atlantic Underwater Tracking and Evaluation Center (AUTEC) would be much easier if we had even better protection against destruction by undersea life. (Abstracted from "Industrial Bulletin," Arthur D. Little, Inc.)

# INTERNATIONAL

## UN'S Caribbean Vessels Are Active

The 3 vessels connected with the UN/FAO Caribbean Fishery Development Project were active during December 1967. The "Alcyon" conducted bait fishing and scouting for skipjack tuna schools while sailing around Jamaica. Although live bait was available in good quantities, there was little evidence of schooling skipjack or other tuna.

The "Calamar" worked with trawl gear off the north and east coasts of Trinidad, the mouth of the Orinoco River, and the western extremity of Guyana. Fishing off Trinidad's north coast presented new challenges to the crew because strong currents and rough bottom caused gear problems not encountered on the comparatively good grounds off the Guyanas. Although the trip was primarily exploratory, over 4 tons of good food fish (including moonshine and nice snappers) were landed at Port-of-Spain.

The "Fregata" sailed to Curacao in early December. She was scheduled to operate from there until February or March 1968. En route, a large school of skipjack tuna was observed north of Tortuga Island, Venezuela. Several were hooked on troll gear. Limited activities after arrival included light and lift-net fishing for bait--hampered by a full moon.

## ICES Convention Likely to Enter Into Force July 1968

Italy has "unofficially" ratified the new ICES (International Council for the Exploration of the Sea) Convention. She is the last of 16 signatory nations. ICES entry into force on July 22, 1968, is expected. No formal announcement has yet been made because there is some question over whether Italy submitted her ratification in proper form. No problem is expected, however. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 5, 1968.)

## Finland Studies OECD Membership

Finland has begun a study of the implications of full membership in the Organization for Economic Cooperation and Development, OECD, including the various possibilities and terms of membership. She was expected to begin informal discussions with the OECD secretariat sometime in January 1968. (U. S. Embassy, Helsinki, Jan. 5, 1968.)

## 1967 Eastern Tropical Pacific Tuna Catch Sets Record

The 1967 combined catch of yellowfin and skipjack tuna in the eastern tropical Pacific has been estimated by the Inter-American Tropical Tuna Commission (IATTC) as 222,000 short tons. This is the greatest combined catch of the 2 species in the Commission's regulatory area.

Based on preliminary figures, IATTC estimated the 1967 yellowfin tuna catch at about 90,000 short tons--about 6 percent above the catch quota of 84,500 tons.

The estimated 1967 skipjack catch was a record 132,000 short tons--more than double 1966's.

# FOREIGN

## CANADA

### 1967 BRITISH COLUMBIA SALMON PACK EQUALS U. S. PACK

The British Columbia (B.C.) salmon pack this season equaled the U. S. pack with 1.46 million cases (48 lbs. per case). For the U. S., it was a disastrous year, the smallest pack since 1899, and down 63 percent from 1966. The B. C. pack was also off from 1966, 20 percent or 350,000 cases, but it was still the second best year since 1962.

| B. C. Canned Salmon Pack, 1962-1967 | | | | | | |
|---|---|---|---|---|---|---|
| Species | 1967 | 1/1966 | 1/1965 | 1964 | 1963 | 1962 |
| | (Standard Cases--48 1-Lb. Cans) | | | | | |
| Sockeye | 558,910 | 407,949 | 245,798 | 343,359 | 158,375 | 297,717 |
| King | 14,962 | 14,585 | 18,891 | 9,127 | 10,000 | 7,174 |
| Steelhead | 1,294 | 2,480 | 843 | 1,262 | 771 | 815 |
| Blueback | 7,798 | 21,087 | 21,300 | 36,259 | 11,384 | 12,097 |
| Coho | 138,869 | 260,536 | 273,984 | 168,473 | 146,099 | 175,638 |
| Pink | 650,460 | 951,794 | 287,925 | 464,107 | 757,452 | 1,188,661 |
| Chum | 93,995 | 160,784 | 65,216 | 232,721 | 119,190 | 134,483 |
| Total | 1,466,288 | 1,819,215 | 913,957 | 1,255,308 | 1,203,271 | 1,816,585 |

1/Revised.
Source: Canadian Department of Fisheries.

Pink and sockeye salmon dominated the Canadian pack and accounted for all but about 200,000 cases of the total. Red salmon was the U. S. leader, followed by pinks and chums. U. S. totals for reds, coho, and chum were off about 50 percent, while pink salmon was about one-sixth the 1966 pack. B. C. packs for individual species were down for all except sockeye, which were up 150,000 cases, and king, up 400 cases. (B. C. Canned Salmon Pack Bulletin, Dec. 2, 1967, and Alaska Salmon Report 13, Dec. 1.)

* * *

### THE NEWFOUNDLAND FISHING INDUSTRY IN 1967

A trend was reversed for the first time in several years: the salted cod business increased and the frozen groundfish business decreased. It was caused by a downturn in the U. S. frozen fish market and a good market for salt cod.

The Province's fishermen made a record catch in 1967--746 million pounds, nearly 10 percent above 1966--yet the gross value was C$26.8 million, only 1 percent over 1966. Meanwhile, the cost of producing fish has increased steadily, leaving the industry depressed.

Leaders of the frozen-fish industry claim the current price allows no profit.

Landings of Important Species

Landings of various species in millions of pounds were: cod, 313; lobster, 3; salmon, 3.9; turbot (Greenland halibut), 31.7; capelin, 7.7; squid, 11.2; and 42,070 seals. Fish meal production totaled 17,600 short tons; fish oil, 2 million gallons.

The Frozen Fish Trades Association plans, with Provincial Government help, to contest the constitutionality of an Oregon State law forbidding sale of "Greenland halibut" in Oregon.

Frozen Groundfish Production Declines

Frozen groundfish production in 1967 was 104 million pounds, the first decrease in 11 years. Local speculation is that lower prices for frozen fish produced a cutback in production everywhere--causing a reduction in world supply of frozen cod blocks, which may strengthen price eventually. However, this tendency will be offset in the U. S. by increased pressure on the market because Denmark's devaluation will put Danish and Greenland fish in heavy competition. Also, Iceland fish will be another strong competitor for the U. S. market. Normal Canadian imports into the United Kingdom will be off.

Canada (Contd.):

This will depress U. S. market further as Canadians attempt to sell relatively more in the U. S.

The Fleet

In 1967, 20,290 fishermen, including 12,300 full-time fishermen, were employed. The fleet consisted of 10,690 motor vessels; 5,300 nonmotorized boats; 248 long-liners under 25 tons, 38 long-liners over 25 tons, 64 trawlers, and 8 small inshore draggers. (Canadian Federal Fisheries Department.)

Problems Ahead

Newfoundland was on a "cod economy" for generations. Fishing will continue to be important to its economy. However, the trend is toward modern equipment and techniques and mass production. This means that fewer people will be employed in the industry and marginal producers will be forced out. (U.S. Consulate, St. John's, Jan. 8, 1968.)

* * *

## NO WHALING THIS YEAR

The Western Canada Whaling Co., the only Canadian whalers in the Pacific, will not operate its fleet of 5 ships in 1968 for economic reasons. The company will study the situation again next fall. It operates a whaling station at Coal Harbor in Quatsino Sound.

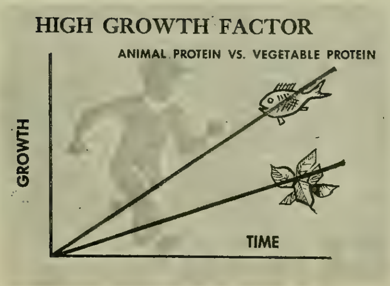
There was less demand for whale meat as mink feed. Improved Japanese living standards meant less demand for the meat as a food for people. The oil market also was down. The 1967 catch was poor. It consisted chiefly of sperm whales, the least valuable.

* * *

## BRITISH COLUMBIA HERRING FISHING STOPS

The British Columbia (B. C.) herring fishery ended on Oct. 29, 1967, and was scheduled to remain inoperative until Jan. 7, 1968, as fishermen and fish companies joined in asking the Canadian Government to close the herring fishery for conservation purposes. The total catch through October 7 was one-third less than last year's 47,000 short tons.

Fishermen are rejecting the recent cut in exvessel prices, which are negotiated by contract. Unemployment in the industry has prompted proposals to alleviate fishermen's difficulties. The proposals include direct subsidies and hiring of fishermen by the Federal Government for conservation and research work. Herring fishermen, primarily due to strikes, have not worked a full season since 1951. (U. S. Consulate, Vancouver, Dec. 1, 1967.)




# EUROPE

## USSR

### 1967 CATCH OFF U. S. PACIFIC COAST WAS NEAR 200,000 TONS

In 1967, the Soviet Union landed an estimated 200,000 metric tons of fish off the U. S. Pacific coast: about 120,000 tons off Washington and Oregon, over 70,000 tons off California. In addition, about 20,000 tons were taken off Mexico. The total 1967 Soviet catch from Washington to about the tip of Baja California was about 210,000 metric tons. These data are based on preliminary Soviet catch figures for the first 11 months.

#### Smaller Than 1966 Catches

The catch off Oregon and Washington was composed of Pacific hake, about 112,500 tons, and Pacific ocean perch, about 7,500 tons. Both catches are below 1966's, when 128,259 metric tons of hake and an estimated 10,000 tons of ocean perch were landed. A precise figure for 1966 ocean perch catch off Washington and Oregon is not yet available because the Soviets report their total Pacific ocean perch catch as one figure; they do not break it down by specific areas. More detailed data by areas may be available in 1968, when U. S. and USSR fishery experts meet again to discuss Pacific cooperative research programs.

Precise catch by species off the State of California is not known. It is estimated that over half the total, about 40-50,000 tons, was hake, and the rest rockfish species.

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### BUILDS MODIFIED FLOATING CANNERY

Several years ago, the Soviets began building the "Zakharov" class 12,600-gross-ton floating canneries in the Admiralty Shipyards at Leningrad. Most of the vessels were delivered to the Far Eastern Fisheries Administration. They were first used in the king crab fishery and later also in herring, saury, and other northwestern Pacific fisheries. In Dec. 1966, this class was used for the first time in shrimp processing off the Shumagin Islands.

Now the same shipyard has begun building a modified version. The gross tonnage is the same but the processing capacity is increased substantially. Instead of 200,000 cans a day, the modified "Zakharov" cannery is capable of packing 300,000 cans of herring or 180,000 cans of tuna. Another innovation is the capability of producing fish paste and equipment to freeze both cooked and raw shrimp. A fish meal and oil plant is included in both the old and new versions.

The new type, the "Korablestroitel Khlopotov," was finished on Sept. 15, 1967. In November she sailed from the Baltic towards Vladivostok, her home port.

* * *

### FISH CULTURE IN POWER-PLANT-WARMED WATERS

In early 1966, an editorial in the Soviet fishery journal "Voprosy Ikhtiologii" discussed implementation of directives issued to fishery scientists by the 23rd Congress of the Soviet Communist Party. The editorial noted that in the next 5 years the number of thermal electric power plants would rise greatly. The Ministry of Fisheries should plan to use these warm waters for fish culture--even to "change the regime of rivers into which thermal waters flow."

By May 1967, a decision was made to begin experimental work at the Konakovo Thermal Electric Plant (in Upper Volga region). Cooling waters of the plant were to discharge into a pond to be built nearby. Ponds would not freeze in the winter, an important consideration in the more northern latitudes of the USSR. The results are not known, but the experiment must have been highly successful because, by October 1967, the Ministry of Fisheries decided to begin constructing the first large-scale pond complex fed by thermal waters.

#### Site Selected

The site selected is about 50 kilometers from the giant Novocherkassk Thermal Electric Plant (on the Don River not far from its mouth). A canal will be built to supply warm

USSR (Contd.):

waters to 133 ponds encompassing about 3,500 hectares (actual pond area is unknown). An incubation hatchery will produce fingerlings from fish eggs; a plant to produce granulated "fish fodder" is also being built at the site. Expected annual production of the 133 ponds is 6,100 metric tons of fish a year.

There was no mention of costs. However, since profit is of prime importance under the newly introduced economic reforms, it is assumed that the thermal fish ponds will be a paying proposition. Construction of the complex began in early fall 1967. It is not known when it will be finished.

* * *

## ORDERS NEW STERN TRAWLERS FROM DENMARK

In December 1967, the Soviet's vessel-importing agency, "Sudoimport" of Moscow, contracted with Burmeister & Wain Shipyards of Copenhagen for 6 large stern freezer trawlers. The 4,600-gross-ton vessels will be similar to other freezer trawlers built by the same shipyard for the Soviet fleet over the past 5 years. There is one significant difference: 3 of the newly ordered vessels will accommodate 75 fishermen-trainees. (U. S. Embassy, Copenhagen, Jan. 5, 1967.)

By April 1967, the Copenhagen shipyard had built about 40 fishery vessels for the Soviets with a total tonnage of about 200,000 gross tons. The 1964 cost of the "Skryplev"-class vessels was about US$3.3 million per vessel.

### Much Progress in Fishermen Education

The Soviet Ministry of Fisheries has made great progress in fishermen's education. It is only slightly behind similar West European schools in quality and second to none in quantity. One problem is how to give fishermen apprentices actual experience on the high seas. Several training vessels are available for training in navigation, but fishing experience is obtained mostly on commercial vessels.

* * *

## NORTH SEA HERRING STUDIED

Soviet fishery scientists from the Polar Research Institute for Fisheries and Oceanography conducted exploratory stern trawling in the Norwegian Sea. Their purpose was to study stocks of adult herring in winter habitat. The study was headed by O. M. Kiselev, Director of the Institute's Laboratory for Underwater Research Techniques. ("Pravda," Dec. 8, 1967.)

The scientific cruise was due in part to poor Soviet fishing in the Norwegian Sea during fall and winter 1967. This was apparently caused by bad weather and possibly other factors. Scarcity of herring in the North Atlantic lately has been worrying the Soviets, the Poles, East Germans, and other North Atlantic fishermen. The Soviet Western Fisheries Administration reacted to this situation late in 1967 by switching about 100 Baltic Sea-based vessels to the North Sea and the Skagerrak Straits. Soviet fishermen have not fished there for over 2 years.

### Seek Cooperation With Danes

The Commander of the Skaggerak Soviet fishing fleet told port authorities at Skagen, northernmost Danish fishing port, that he wanted to "exchange information on midwater trawling." The Soviets were especially interested in pair-trawling. The Fishermen's Association in Skagen proposed that the Soviets come into port, but the commander replied that there was no time for that. A Danish cutter was reportedly scheduled to meet with Soviet fishermen in the Kattegat. (Regional Attaché, U. S. Embassy, Copenhagen, Jan. 5, 1968, and other sources.)

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## WESTERN PACIFIC SALMON STOCKS STABILIZE

Western Pacific humpback salmon stocks have stabilized, Soviet ichthyologists believe. This is based on recent studies in spawning areas on the Sakhalin and Kuril Islands. Only a few years ago, the fast-growing and wide-ranging humpback salmon found in rivers of ly a few years ago, the fast-growing and wide-ranging humpback salmon found in rivers of the Soviet Far East was "on the verge of extinction." The Government took drastic steps

160 rivers and 80 lakes in the Far East. It banned discharge of industrial waste into salmon spawning rivers. A vast hatchery program was established (over 30 salmon hatcheries produced billions of incubated salmon eggs).

Millions of Fingerlings Released

In late 1967, over 600 million salmon fingerlings were ready to be released into the Pacific from Sakhalin hatcheries alone. Also, millions of salmon eggs were flown from Pacific hatcheries to Barents, White, and Caspian Sea biological stations for transplanting into those waters. ("Tass," various press releases.)

The research was done by the All-Union and Pacific Fishery Research Institutes. Canned salmon for years has been a primary earner of hard foreign currencies, a factor influencing Soviet efforts.

* * *

## HARVESTS MORE N. PACIFIC FUR SEALS IN 1967

Fur-seal herds on the Soviet islands in northwestern Pacific are growing rapidly. Their number is approaching an optimum level, Soviet scientists believe. As result, the 1967 fur-seal harvest by the USSR was larger than in 1966. ("Tass," Oct. 11, 1967.) The Soviets give two principal reasons for this: the International Fur Seal Convention, which prohibits pelagic open sea sealing, and Soviet conservation and propagation efforts.

Gives Skins to Canada and Japan

The Soviets give Japan and Canada 15 percent of their annual harvest. In 1966, this was 2,777 skins for each country out of a Soviet harvest of 18,514 skins. The USSR did not start giving Japan and Canada any skins until 1964, when the Protocol to the Convention specified that each country would receive 1,500 skins. In 1966, Japan and Canada demanded and received the 15 percent. They also get that percentage from the U. S. harvest. In return, they abstain from pelagic sealing.

USSR Supports Convention

The Soviet Union supports the continuance of the International Fur Seal Convention, which she signed in 1957 along with the U. S., Japan, and Canada. Statement of support was issued in Moscow from the Soviet Ministry of Fisheries in September 1967. They credited the Fur Seal Convention with helping to save fur seals from "virtual extinction" and call for "guarantees for a long life" of the Convention.

History of Convention

The Fur Seal Convention originally was signed in 1911, but in October 1941 Japan withdrew. In 1957, after 18 months of negotiations, a 6-year Interim Convention was agreed on. During those 6 years, scientists were to determine the necessity of fur-seal management and conservation--and whether pelagic sealing should be permitted. In 1963, the Interim Convention was extended until 1969. Throughout the negotiations leading to the Interim Convention, the Japanese maintained that fur seals consume large stocks of fish and that it had not been demonstrated that pelagic sealing was unduly harmful. The U. S., USSR, and Canada maintained that the need for fur-seal conservation was evident and that pelagic sealing is less desirable than harvesting fur seals on land. The USSR might press for a permanent convention in 1969.

## NEW RUSSIAN-ENGLISH DICTIONARY OF FISHERY TERMS

Published by the U. S. Department of Commerce, Joint Publications Research Service. It is a translation of Russian-language dictionary compiled by A. A. Klykov, "Kratkiy Slovar' Rybatskikh Promyslovykh Slov" (Short Dictionary of Commercial Fishery Terms), published by Food Industry Publishing House, Moscow, 1959. The translation has been edited and revised by Dr. W. E. Ricker, Chief Scientist, Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C. It has 67 pages and includes a bibliography reference index. It will help scientists and others interested in Soviet fishery literature.

The dictionary is available from Joint Publications Research Service, Adams Drive, 4th and 6th Streets, S. W., Washington, D.C. 20443, as JPRS translation 44,072; $3.00 per copy.

## East Germany

USSR REJECTS POORLY MADE TRAWLERS

A Soviet Commission has refused temporarily to accept large stern freezer trawlers of the "Atlantik" class ordered from the East German People's Shipyards at Stralsund. One reason is poor quality of the Diesel main engines, manufactured in the heavy machinery plant at Magdeburg. ("Neues Deutschland," Oct. 18, 1967.)

The East German newspaper charged that the main reason for the poor quality of the engines was the plant's bad management and failures in "ideological" work. The manager was charged with "mediocrity and self-complacency."

The Soviets have ordered over 100 vessels of this class. They were to replace "Tropik" class vessels also constructed at Stralsund.

First Tropiks Troublesome

The Soviets have had considerable trouble with the first Tropik class vessels. The second of these, the "Tukan," sank suddenly in the Skaggerak Strait off the Danish coast in early 1967 with a loss of 57 lives. If Soviet investigation revealed the sinking connected with design or construction work, they would scrutinize construction details of similar class vessels by the same shipyards.

/The delivery to Denmark of smaller side trawlers built in another East German shipyard presented no problems. See CFR, Jan. 1968, p. 53./

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EXPANDED ATLANTIC FISHERIES IN 1967

In 1967, East Germany expanded its fisheries into the southwestern Atlantic, mid-Atlantic, and Georges Bank. By early January 1968, over 2,000 East Germans were fishing on those grounds. This expansion has been aided by the Soviets, who gave the East Germans fishing experience data for those areas. The Soviets also trained them in purse-seining. In 1968, for the first time, 13 East German trawlers will be using this method in new fishing areas. This will make it possible to increase significantly the catch per unit of effort--and give them a greater choice of fishing grounds. It will help avoid difficulties encountered in 1967. ("Neues Deutschland," Jan. 2, 1968.)

E. Germany No. 3 Builder

Surpassed only by Japan and Poland in 1966, East Germany built 82,500 gross tons of fishing and support vessels, or about 14 percent of world construction. Of 66 vessels built, 29 were large stern freezer trawlers for Soviet buyers. One was a mothership of over 10,000 tons. The others were side trawlers mostly for East German fleets, and a few for export.

In mid-1967, the East Germans had orders for fishery vessels totaling 170,000 gross tons. Most will go to the Soviets: 102 large stern freezer trawlers of "Atlantik" class are on order with Stralsund Shipyards for Sudoimport of Moscow. Some will go to Iceland, Sweden, Denmark, and Tanzania (Zanzibar). The rapidly increasing construction rate has made possible expansion into fisheries of Southwest and Southeast Atlantic and Georges Bank.

Forced to Expand

Because of their dependence on only 2 major fisheries (North Atlantic herring and cod), the East Germans were forced to look for more fishing areas when stocks of those species declined in 1966 and 1967. This decrease soon showed up in their catches. Despite new vessels, the total East German catch in 1966 was 3.7 percent less than in 1965. Data for 1967 have not yet been published, but the total catch for the first 5 months was below the planned quota. In early 1967, ice and bad weather made the Labrador winter cod season a failure. Fishing off Newfoundland in late spring 1967 also proved poor, so the best solution for the East Germans was to keep moving south. They did--and ended on Georges Bank in mid-summer. A few vessels went to the southwestern Atlantic using Havana as a base.

## Denmark

DEVALUATION PRODUCES MIXED BAG

On Nov. 19, 1967, Denmark devalued its kroner by 7.9 percent. The immediate effect

Denmark (Contd.):

was that fishery exports became cheaper in terms of nondevalued currency. The action was expected to permit profitable operations without granting the subsidies fishermen wanted. But now some trade circles are concerned that the advantages may be short-lived and the gains reduced by serious losses.

Since Denmark devalued less than the United Kingdom (U.K.) and Iceland, her competitive position with them was weakened. Moreover, materials and supplies imported from countries that did not devalue became more expensive. Shipping costs also became more costly.

Sales to U. K. Hurt

Because the United Kingdom devalued by 14.3 percent, Danish sales to U. K. are being affected adversely. Also, most fishery products (except frozen fillets) exported to, or landed in, Britain must pay a 10-percent duty. Together, these factors make trading prohibitive unless Danish fishermen reduce prices further.

Iceland's greater devaluation will gain her certain advantages in U. K. Accordingly, Denmark's exports to U. K. may be expected to decline.

Sales to U. S. Helped

Sales to the U. S. will be strengthened by devaluation. Most sales by Denmark, Greenland, and the Faroe Islands are made in terms of dollars. Devaluation makes the product cheaper to produce in the Danish economy. Lower prices of fishery products also should assist exports to West Germany, one of Denmark's major markets, and to other Common Market countries.

Faroes Optimistic

The Faroe Islands expect their position to be improved for exports of salted and dried fish to Italy and Greece. They hope to win back markets in Brazil, which were lost several years ago to Norway. Exports to Spain and to U. K. will be affected adversely. However, Iceland's greater devaluation may help her in some of those markets and in Latin America and in Africa.

Pressures to Help Fishermen

It is likely that devaluation will lead to increased pressures on the Danish Parliament to enact subsidy legislation for fisheries. The products fishermen must buy in foreign countries may be expected to rise at least 8 percent. Danish products from local raw materials are not expected to rise substantially, except when necessary to compensate for higher priced imports used in producing them.

Imports of frozen salmon from the U. S. and Canada will cost consumers more as a result of devaluation; this could reduce sales. Danish firms must spend more kroner to buy the dollars necessary to pay for frozen salmon. (U. S. Embassy, Copenhagen, Jan. 12, 1968.)

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## FY 1967 LOANS BY ROYAL DANISH FISHERIES BANK NEAR US$4 MILLION

The Royal Danish Fisheries Bank processed 212 loan applications in fiscal 1967--Apr. 1, 1966-Mar. 31, 1967. It made 168 loans for US$3.9 million. Most loans (82) were to buy new vessels; loans for new motors (41) were the next most numerous.

When a loan is approved, the fisherman receives bonds for the amount of the loan, and he must sell them to receive his funds. Bonds issued in fiscal 1967 carried either 6 or 7 percent interest. For fiscal 1968, there will be an increase in the legal limit under which the bank operates--from 150 million kroner (US$21.8 million) to 200 million kr. (US$29 million). The increased limit ends on March 31, 1968. In FY1968, borrowers will also bear the administrative expenses of operating the bank. (U. S. Embassy, Copenhagen, Dec. 8, 1967.)

* * *

## VACUUM-DRIED SHRIMP MEAL USED IN TROUT FEED

The flavor and pink flesh color of trout reared in Danish ponds are now being enhanced by feeding the fish vacuum-dried meal made from shrimp processing waste. Experiments at the pond trout research laboratory at Brøns have shown that feeding

Denmark (Contd.):

fresh raw shrimp waste improves flesh color in pond trout; experiments in feeding common shrimp meal dried at high temperatures, however, showed no such improvement. Scientifically controlled feeding tests of vacuum-dried shrimp meal have not been conducted at Brøns, but pond trout farmers are convinced of the value of vacuum-dried meal in trout feed. Flesh color improvement through vacuum-dried meal varies somewhat, but flavor improvement is considered a complete success.

The Product

The company producing vaccum-dried meal from shrimp waste has had its drying plant in operation for about 18 months. The product is described as having remarkably good color and quality. The plant is said to get about a 50-percent higher price per kilo for vacuum-dried meal than Norwegian suppliers are paid for common shrimp meal processed at higher temperatures.

Another firm uses the vacuum-dried meal in trout feed produced under license from a U. S. company. Amounts of common shrimp meal are also used in feed formulation because adequate supplies of vacuum-dried meal have not been available. Most feed producers consider about 15 percent shrimp meal essential in pond trout formulations.

The Plant

Vacuum-dried shrimp meal from Greenland will be transported to Denmark for sale to firms producing trout feed. The cost of the vacuum-drying plant, excluding building and steam boiler, is estimated at 750,000 Danish kroner (about US$100,000). The electric power requirement for the plant is about 120 horsepower, and steam consumption will be about two tons per hour. Although it can also be used for drying waste from fish-filleting operations, the unit contains no defatting equipment and, therefore, would not be usable for such fatty fish as herring. Both the Greenland and Saeby plants were designed by the consulting engineer firm of E. H. Matthiesen, Generatorvej 45, Herlev, Denmark. (Regional Fisheries Attaché, U. S. Embassy Copenhagen, Dec. 22, 1967.)

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LARGEST FISH MEAL PLANT TO EXPAND

Denmark's largest fish meal plant will be expanded during 1968 at a cost of US$430,000 to handle increased catches of industrial fish from the North Sea. The larger catches have resulted from more intensive fishing and a general increase in size of vessels. If the plant is not enlarged, the fishing cooperative will have to place catch restrictions on its members. (Regional Fisheries Attaché, U.S. Embassy, Copenhagen, Jan. 5, 1968.)

* * *

SHIPBUILDING ACTIVITY RISES IN FAROE ISLANDS

Shipbuilding in the Faroe Islands has improved because the Danish National Bank will purchase at full par value the interest obligations for vessel loans made by the Faroese Government. Two stern trawlers (US$1 million each) are now being built, and another valued at US$1.4 million is on order from a Germany shipyard. All 3 have about 2,200-hp. engines. (U. S. Embassy, Copenhagen, Dec. 1, 1967.)

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AIDS THAILAND

Over a 5-year period, Denmark will contribute equipment and instruments worth three million kroner (US$400,000) to a marine biological station to be established in Thailand. Denmark will send 2 marine biologists and an assistant to start the station's research program. Any Thais who wish to be educated as marine biologists will be welcome. Thailand will make buildings available for the station.

The new station will be built at Phuket in south Thailand as part of that country's plans to extend her fisheries throughout the Bay of Thailand and beyond to the South China Sea and Indian Ocean. ("Vestkysten," Nov. 21, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24, 1967.)

## Iceland

THE 1967 CATCH

Iceland's herring catch through Dec. 2, 1967, was 42.7 percent below comparable 1966 figures. The herring catch to date totaled 1967--393,000 tons; 1966--686,000 tons. Export value has dropped 50 percent, reflecting the decline in fish catch and world price.

Herring is the principal element in Iceland's catch each year and the principal fish foreign-exchange earner.

Of the 393,000 tons, 40,000 tons (297,000 barrels) were salted. This is 8,600 tons (63,000 barrels) short of the 360,000 barrels contracted for in advance foreign sales earlier in the year.

Groundfish Situation Better Than Herring

Though the groundfish picture was less bleak than the herring, it still showed a 15.2 percent decrease in quantity. Groundfish (cod is the principal one) are generally caught between January and May. The 1966 season produced 207,000 tons; the 1967 catch fell to 175,000 tons.

Smaller Fleet

In 1967, the number of fishing vessels declined: 166 boats fished herring (200 in 1966); 22 trawlers fished groundfish (28 in 1966).

At the end of October 1966, the trawler catch was 52,000 tons; the comparable 1967 figure was 64,000 tons. The catch since October has been very poor, however, so the 12-month 1967 total may be lower than 1966.

Fishermen's Income Drops

Fishermen too have suffered. In 1966, the average share of the catch per man was 173,000 kronur (US$3,035 at new rate of exchange US$1 = 57 IKr.). (U. S. Embassy, Reykjavik, Dec. 14, 1967.)

* * *

AIDS FISHING INDUSTRY AFTER CURRENCY DEVALUATION

One Icelandic Government measure adopted following devaluation provides for payment in local currency of all 1967 export proceeds to exporters at the exchange rate prevailing before devaluation (Nov. 19, 1967). This applies to payments for exports contracted before the end of 1967. The Treasury was to retain the differential between old and new rates of exchange.

On Dec. 18, 1967, a government bill was passed allocating to fishing industry these Treasury-retained "devaluation gains." The bill provides that the gains be used to pay certain costs and compensations to various fisheries sectors; the remainder is to be used to establish a price equalization fund for all exported fisheries products.

Where Gains To Be Used

Part of the devaluation gains is to be applied first to subsidies to stock fish producers; subsidies to herring reduction factories for reduction of herring caught off North and East coasts in fall 1967; compensation for price falls on frozen shrimp processed in 1967; increased production costs of fisheries during remainder of 1967 due to devaluation; and miscellaneous subsidies.

Remaining funds may be used up to 25 percent to pay insurance premiums of vessels; up to 25 percent to Fisheries Fund and State Guarantee Fund for reorganization of fisheries and to increase productivity; up to 25 percent to a special exchange equalization fund within the Fisheries Fund for loans to meet devaluation losses on foreign debts sustained by fishing-vessel owners; the remaining funds are for the Price Equalization Fund.

New Equalization Fund

The new Fund is an expansion of the 1967 Equalization Fund that compensated for export price declines only on frozen white fish. The new Fund coverage is broadened to compensate for export price declines of all exported fisheries products. Moreover, the Fund's purpose is to equalize effects of world price fluctuations on domestic industry by using proceeds accruing in times of high prices to offset losses when price fall. (U.S. Embassy, Reykjavik, Dec. 21, 1967.)

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Iceland (Contd.):

EXPORTS OF FISHERY PRODUCTS, JAN.-SEPT. 1966-67

The Icelandic "Statistical Bulletin," Nov. 1967, contains these export figures:

| Product | Jan.-Sept. 1967 | | | Jan.-Sept. 1966 | | |
|---|---|---|---|---|---|---|
| | Qty. | Value (f.o.b.) | | Qty. | Value (f.o.b.) | |
| | Metric Tons | 1,000 Kr. | US$ 1,000 | Metric Tons | 1,000 Kr. | US$ 1,000 |
| Salted herring . . . . . . | 11,049 | 140,181 | 3,264 | 18,928 | 247,621 | 5,765 |
| Other salted fish . . . . | 18,878 | 363,084 | 8,454 | 23,773 | 457.557 | 10,653 |
| Stockfish . . . . . . . . . | 2,586 | 96,112 | 2,238 | 4,744 | 158,549 | 3,691 |
| Herring, frozen . . . . | 11,807 | 74,165 | 1,727 | 13,757 | 89,140 | 2,075 |
| Fish fillets, frozen . . | 28,810 | 631,986 | 14,714 | 30,359 | 799,768 | 18,621 |
| Shrimp & lobster, froz. | 774 | 104,710 | 2,438 | 975 | 140,553 | 3,272 |
| Fish and whale oil . . . | 63,268 | 372,034 | 8,662 | 64,668 | 522,065 | 12,155 |
| Fish meal . . . . . . . . | 98,086 | 619,020 | 14,413 | 114,994 | 863,375 | 20,102 |
| Other . . . . . . . . . . . | 60,469 | 562,038 | 13,085 | 53,315 | 693,075 | 16,139 |
| Total exports . . . . | 295,727 | 2,963,330 | 68,995 | 325,513 | 3,971,703 | 92,473 |

Note: Values converted at rate of 42.95 kroner equal US$1.00.

## Ireland

ISSUES FISH-HANDLING REGULATIONS

The Irish Government made public its regulations on fish handling as the latest step in its efforts to modernize the fisheries and to move into world markets. The "Demersal Fish (Handling, Storage and Transport) Regulations 1967" will enter into force on July 1, 1968.

The regulations relate to whole demersal (bottom-dwelling) fish or pieces intended for human consumption. Procedures for handling, storing, and transporting such fish from capture until they reach the consumer are included. There are sections on cleanliness of fishing vessels, handling of fish at sea; grading, boxing. and icing; transport and distribution; cold storage and sale, and enforcement procedures. ("The Irish Skipper," Dec. 1967.)

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NEW FISH MEAL PLANT

A new company plans to build a fish-meal plant on Ireland's West Cork coast, the most modern in the world. The plant will cost about £275,000 (US$660,000) and handle up to 250 tons fish a day.

Reportedly, there are Irish and Norwegian principals. The site has been selected. Everything is ready to go--if negotiations between the owners and government departments end satisfactorily.

The new plant is planned to employ about 25 people and to keep 15 to 20 vessels and 100 fishermen working year round.

Fish and Modern Techniques Available

It is hoped that the plant will be operating in about a year. Mackerel, herring, pilchard, sprat, and sand eels are believed available in sufficient quantities around the area. Fishermen are now using more modern techniques for catching, including midwater trawls. ("Fishing News," Dec. 29, 1967.)


UNSINKABLE SUIT FROM USSR

A fisherman's unsinkable suit made of waterproof fabric has been designed in the Soviet Union. The suit is provided with an automatic device which supplies air into special cavities of the suit, making it buoyant. In case of a mishap the fisherman can stay afloat for an indefinite time, and the rescue teams can easily find him during the day by the bright orange color of his suit. At night a miniature electric beacon is switched on. ("World Fishing.")

# LATIN AMERICA

## Central American Fishery Development Commission Meets

Delegations from Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama met in San Jose, Costa Rica, on Nov. 28-30, 1967, for the second regular meeting of the FAO-sponsored Fishery Development Commission. International organizations and scientific groups were represented. The main agenda items were the Commission's annual report, the carrying out of the first working plan for a fisheries development project, the fisheries situation in member countries, juridical status of the Commission, and nomination of an administrator. The main issues discussed were use of fish taken incidental to shrimp fishing, and marketing studies of Central American fishery products. With special reference to Honduras and Nicaragua, the participants discussed the nationalization of fishing fleets operating within territorial waters.

Move to Guarantee Commission's Status

A 90-day timetable was set to prepare a statement guaranteeing permanent status to the Commission. This would be presented to member governments for approval. It was agreed to recommend that member countries eliminate port fees for research vessels of the development project.

The next regular meeting will be in Honduras, either in Tegucigalpa or La Ceiba, in about one year. The date will be decided by the Commission President. ("Boletin Informativo," Proyecto Regional de Desarrollo Pesquero en Centroamerica, Dec. 15, 1967.)

## Armour and United Fruit Plan Shrimp Culture

The Armour and United Fruit Companies together have hired a field consultant to experiment in shrimp raising in Central America. Current plans are to conduct normal shrimp trawling to get production underway while experimenting with shrimp culture techniques. The companies also are thinking about clam culture on Mexico's west coast. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Dec. 26, 1967.)

## Mexico

MEXICAN-JAPANESE SHRIMP CULTURE PLAN DROPPED

Plans announced in June 1967 for a Mexican-Japanese shrimp-farming venture on Mexico's Pacific coast apparently have been cancelled. The reason probably was the recent takeover of the west coast shrimp industry by BANFOCO (National Bank for Development of Cooperatives).

The plan called for shrimp raising in a stretch of the Sinaloa-Nayarit coastline between the Santiago and Presidio Rivers. With its lagoons, canals, and estuaries, it was thought this area could do without artificial ponds, controlled temperatures, and costly feeding--and rely on natural nutrients. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Dec. 26, 1967.)

## Ecuador

SEEKS FRENCH AID FOR FISHERIES DEVELOPMENT

The Ecuadorean Embassy in France reported that Ecuador would seek agreements with France during 1968 to develop the Ecuadorean export industries. (Radio - Quito, Dec. 27, 1967.)

## British Honduras

GRANTS DEVELOPMENT INCENTIVE TO NEW PLANT

The Government of British Honduras has issued a Development Incentive Order for Belize Marine Products Ltd. The enterprise will be a refrigerating plant for storage and freezing of "scale" fish for export. No fish other than scale fish may be used. The Company's vessels must operate outside British

British Honduras (Contd.):

Honduran waters. All scale fish offered for sale by local fishermen must be bought within the capacity of the plant.

Expansion After 4 Years

After 4 years, the enterprise shall be extended to include either a tuna and scrapfish canning plant, or a plant producing fish protein concentrate. The company's tax holiday extends from March 20, 1967, to March 21, 1978. Date of production is one year from date of development incentive order. (U. S. Consul, Belize City, Dec. 21, 1967.)

## Chile

### NORTHERN FISHING INDUSTRY REORGANIZED DRASTICALLY

The Chilean Government has forced the northern Chile debt-plagued fishing industry to face economic reality. Recent government grants of advantages and subsidies to integrated companies have forced readjustment, with these results: (1) elimination of one-half the anchovy fleet and one-third the fish meal plants, (2) consolidation under leadership of the strongest companies, (3) diversification by adding to fish meal facilities freezing and canning facilities, and (4) near-nationalization by the Corporacion de Fomento de Produccion (CORFO), Chile's development and finance corporation.

What CORFO Will Do

CORFO will loan US$10-15 million to integrated companies to pay off old debts. It will guarantee payments to creditors. This is a move calculated to restore confidence in Chile's business image. Even debts of near-bankrupt companies not planning to open will be paid. Of 28 fish-meal producers in Arica and Iquique, 6 integrated companies will survive. Each will have 2 or 3 plants strung along the coast, with a total capacity of at least 120 tons per hour. Maximum combined output annually should not exceed 200,000 tons of fish meal. Only 130-150 of the 300 available vessels will fish. Only integrated companies will be eligible for CORFO benefits. Bonuses up to 30 percent of f.o.b. value of exported value are still available for integrated plants, but now it is at President's discretion to decide whether independent companies can get a bonus. It seems all independent fishing companies will disappear.

Arica and Iquique Affected

Ten plants in Arica and Iquique (all modern but two) will be closed. These include the Industrias Pfizer del Mar, a 60-ton-per-hour Standard Steel plant with a 4-stage stickwater concentration. The firm belongs to Pfizer International of New York. Some closed plants probably will be sold by CORFO to fishing companies in central and south Chile. Some purse seiners will be converted to trawlers and sold abroad. ("Ocean Fisheries," Jan. 1968.)

* * *

### FISH MEAL AND OIL PRODUCTION DROPS IN 11-MONTH PERIOD

These are the latest available data for North Chile's anchovy catch, fish meal and oil production, Jan.-Nov. 1967:

| | 1967 | 1966 | 1965 |
|---|---|---|---|
| | . . . . . (Metric Tons) . . . . . | | |
| Anchovy Catch: | | | |
| November. . . . . . . . | 31,165 | 9,602 | 8,978 |
| Jan.-Nov. . . . . . . . | 605,900 | 1,029,824 | 319,037 |
| Fish Meal Production: | | | |
| January . . . . . . . . . | 15,983 | 333,504 | 12,836 |
| February . . . . . . . . | 20,294 | 27,113 | 11,371 |
| March. . . . . . . . . . | 7,794 | 15,536 | 10,278 |
| April . . . . . . . . . . | 1,651 | 14,067 | 3,587 |
| May . . . . . . . . . . | 3,447 | 26,754 | 4,090 |
| June . . . . . . . . . . | 16,487 | 18,783 | 2,989 |
| July . . . . . . . . . . . | 13,331 | 17,865 | 2,188 |
| August . . . . . . . . . | 6,054 | 17,978 | 3,651 |
| September . . . . . . . | 11,656 | 11,696 | 794 |
| October. . . . . . . . . | 11,408 | 2,687 | 888 |
| November. . . . . . . . | 6,554 | 1,887 | 1,453 |
| Jan.-Nov. Total . . . | 114,659 | 187,870 | 54,125 |
| Fish Oil Production: | | | |
| November. . . . . . . . | 601 | 304 | 136 |
| Jan.-Nov. . . . . . . . | 8,580 | 18,706 | 7,234 |

In November 1967, 28 percent (1,898 metric tons) of the anchoveta were landed in Arica, and 72 percent (4,656 tons) in Iquique. In Arica, 4 plants operated an average 9 days and produced 1,898 tons of meal; in Iquique, 10 plants worked an average 15 days and produced 4,656 tons of meal.

In addition to anchovy meal, November's production of other fish meal was 4,555 tons produced in Mejillones, San Antonio, and Talcahuano. In November 1966, production was 2,189 tons. During Jan.-Nov. 1967, production of fish meal other than anchovy was 34,876 tons, compared with 28,689 tons for the 1966 period. (Instituto de Fomento Pesquero, Informe Mensual No. 11, Nov. 1967.)

# ASIA

## Japan

### MORE PEOPLE EAT FROZEN FISH

Frozen fish are steadily becoming more important in Japan. Between 35-50 percent of Japan's fish production--which in 1966 reached record of over 7 million metric tons--is being marketed frozen. Growing consumer acceptance of frozen fishery products is due to quality improvement of frozen fish, and the establishment of a low-temperature distribution chain.

After World War II, when landings in coastal and offshore waters began declining, fishery operators started to develop fishing grounds in more distant waters to meet growing domestic demand. This resulted in construction of larger vessels equipped with mechanical refrigeration. To overcome consumer resistance to frozen products, improvement in "freshness" of fish became a critical requirement.

#### Refrigeration Improved

As refrigeration technology advanced, particularly in the last 2-3 years, it became possible to quick-freeze catches aboard vessels at temperatures below -40° C. (-40° F.). This improved keeping quality markedly and increased food value. Fishery operators followed the idea that "the lower the freezing temperature, the higher the fish price." They began to install in newly built and remodeled vessels modern freezing plants capable of lowering freezing point to below -40° C. The advantage of storage at such low temperatures was amply demonstrated in late 1967 when bluefin tuna brought back from the South Pacific off New Zealand sold for over US$2,520 a short ton exvessel.

#### Fish Fresh Despite Long Trip

Along with improved shipboard refrigeration, the Japanese began to build large 5,000-10,000-ton capacity cold storages on land to store tuna and other fish at temperatures below -40° C.

A new era has arrived. Consumers now can be supplied with highly fresh fish taken in distant waters--such as the Atlantic-caught "Monko" squid and the South Pacific bluefin tuna--which often are in much better condition than local catches brought in by slow-moving iced-fish vessels. ("Suisan Keizai Shimbun," Jan. 1, 1968, and other sources.)

* * *

### BERING SEA WINTER TRAWL FISHERY UNDERWAY

Four Japanese mothership fleets will trawl in the eastern Bering Sea this winter. Nichiro Fishing Co.'s "Meisei Maru" (9,356 gross tons) departed Japan in late November 1967 for the Bering Sea, where she will be joined by about eight 499-ton trawlers. Taiyo-owned "Soyo Maru" (11,192 gross tons), which departed Yokohama Dec. 5, began fishing from Dec. 15 with 7 catcher vessels; she will be joined by 2 more vessels.

The "Soyo Maru" fleet will fish primarily for Alaska pollock for use in producing minced meat. The third fleet, led by Kokusai Gyogyo's "Seifu Maru" (8,333 gross tons), departed Yokohama Dec. 20, 1967, with 10 catcher vessels; she will operate until March 1968. The fourth fleet--the "Kashima Maru" and 8 trawlers--which terminated hake fishing in the Pacific Northwest around Dec. 8, was scheduled to arrive in the eastern Bering Sea in late December. The fleet will bottom trawl until the end of February 1968. ("Suisan Tsushin," Dec. 19, 21, 26, 1967.)

* * *

### PACIFIC HAKE FISHERY CUT AGAIN

The Japanese factoryship "Kashima Maru," 7,163 gross tons, and 8 trawlers, which began fishing in the Pacific off Vancouver Island from Oct. 20, 1967, stopped around Dec. 8 because of stormy weather. The Kashima Maru fleet was the second group to begin hake fishing in the eastern North Pacific. It was scheduled to operate until the end of February 1968, with a catch target of 40,500 metric tons of bottomfish. Rough sea conditions and a poor catch of only 2,000 tons compelled the early withdrawal.

#### Owners Lose US$833,000

It is reported that Nihon Suisan, owners of the fleet, lost over US$833,000. The Kashima Maru was scheduled to proceed to the Bering Sea to trawl until the end of February 1968.

Japan (Contd.):

("Shin Suisan Shimbun Sokuho," Dec. 21, 1967, and other sources.)

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## TANNER CRAB FISHING WILL BE RESTRICTED

The Japanese Fisheries Agency plans to establish gear and vessel restrictions on the tanner crab fishery in the Bering Sea and Okhotsk Sea. The purpose is to prevent vessels from incidentally taking king crab in treaty areas of the northern waters.

The tanner crab fishery presently is not controlled. It was developed 2 years ago by Taiyo and Nihon Suisan. Because of growing market value in Japan, over 20 trawling firms reportedly plan to enter that fishery in 1968. ("Suisan Keizai Shimbun," Dec. 21, 1967, and other sources.)

* * *

## UN BUYS CANNED MACKEREL FOR RELIEF FEEDING

The UN Food and Agriculture Organization (FAO) ordered 4,195 cases (48-1 lb.) of canned mackerel from Japan under its program to combat the world food shortage. The order, handled by the Japan Canned Sardine and Mackerel Sales Company, was scheduled to be shipped from Kobe by Dec. 27, 1967. The shipment will meet emergency food needs in Tanzania. ("Suisancho Nippo," Nov. 18, 1967.)

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## ANTARCTIC WHALERS AT WORK

Four Japanese whaling fleets are participating in the 22nd (1967/68) Antarctic Whaling Expedition that began Dec. 12, 1967. The International Whaling Commission (IWC) assigned to Japan a national quota of 1,493 blue-whale units (BWU) for the expedition, a decrease of 140 units from the previous season.

The 2 other active whaling nations, the USSR and Norway, were assigned national quotas of 971 and 731 BWU, respectively. The IWC set an overall catch quota of 3,200 BWU for 1967/68, 300 BWU below 1966/67. ("Suisan Keizai Shimbun," Nov. 6, 1967.)

* * *

## NEW LONG-LINE LURE CATCHES MORE FISH

A new lure called "Korin" (corona), developed and patented by Ebisu Fishing Gear Manufacturing Co. of Yaizu, Japan, achieved remarkable results in recent long-line test fishing. The lure throws off 7 colors of the spectrum. It is attached to an ordinary bait fish as an attractant.

Test fishing was conducted off Ogasawa Islands in the Pacific Ocean south of Japan by the long-liner "Koei Maru No. 10," 39 gross tons; 2,000 hooks were used, each baited with saury. Half the hooks also were equipped with lures.

### Lure Helped Score 50% Higher

Results showed that the hooks baited with saury alone took 36 fish and those with lures 50--an increase of 54 percent in hook rate. Later sets produced similar results. The catch consisted predominantly of albacore but included also sizable quantities of yellowfin and bigeyed tuna.

The lure costs about 4 U. S. cents. It can be used for 10 days of fishing. The vessel's fishing captain claims it will pay for itself. He hopes to test it on the next trip with other baits. ("Katuso-maguro Tsushin," Jan. 8, 1968.)

* * *

| 1967/68 Antarctic Whaling Fleet | | | | | |
|---|---|---|---|---|---|
| Company | Name of Fleet | No. Catcher Vessels | Catch Target 1967/68 | Actual Catch 1966/57 | Increase or Decrease |
| | | | (Blue-Whale Units) | | |
| Taiyo | "Nisshin Maru" | 9 | 403 | 348.5 | ≁ 54.5 |
| " | "Nisshin Maru No. 3" | 9 | 240 | 354.5 | -114.5 |
| Nihon Suisan | "Tonan Maru No. 2" | 12 | 425 | 465 | - 40 |
| Kyokuyo Hogei | "Kyokuyo Maru No. 3" | 11 | 425 | 465 | - 40 |

Japan (Contd.):

## REPORT ON FISH MEAL AND OIL

Japanese consumption of fats and oils continues to rise. The final figure for 1967 was expected to reach 1,240,000 metric tons, 9 percent above 1966. Use for food may increase about 10 percent from 1966. Industry use will increase slightly.

The continuation of trends of recent years--expanding economy, higher consumer spending, changes in food habits--accounts for most of the increase.

Production of whale oil and sperm oil continues to decline and reduce Japanese exports. Production of fish oil is expected to increase because of higher 1967 catches; therefore, imports of fish oil will be very small.

1966 and 1967 Estimates, 1968 Forecast

| | 1966 | 1967 | 1968 |
|---|---|---|---|
| | . . (1,000 Metric Tons) . . | | |
| Fish Meal: | | | |
| Production . . . . . . . . . . . | 347.0 | 350.0 | 350.0 |
| Opening stocks. . . . . . . . . | 1/ | 1/ | - |
| Imports: | | | |
| Year's total . . . . . . . . . | 95.6 | 75.0 | 90.0 |
| January-July total . . . . . . | 60.7 | 44.6 | - |
| Exports: | | | |
| Year's total . . . . . . . . . | 15.8 | 90.0 | 50.0 |
| January-July total . . . . . . | 8.8 | 57.3 | - |
| Edible Marine Oil: | | | |
| Fish liver oil: | | | |
| Production . . . . . . . . . . . | 7.3 | 7.5 | 7.5 |
| Opening stocks. . . . . . . . . | 1/ | 1/ | - |
| Exports: | | | |
| Year's total . . . . . . . . . | 0.5 | 2.0 | 2.0 |
| January-July total . . . . . . | 0.1 | 1.4 | - |
| Fish oil: | | | |
| Production . . . . . . . . . . . | 22.6 | 30.0 | 35.0 |
| Opening stocks. . . . . . . . . | 10.7 | 13.5 | 10.0 |
| Whale oil: | | | |
| Production . . . . . . . . . . . | 55.3 | 50.0 | 42.5 |
| Opening stocks. . . . . . . . . | 7.7 | 6.3 | 7.0 |
| Exports: | | | |
| Year's total . . . . . . . . . | 37.8 | 35.0 | 27.0 |
| January-July total . . . . . . | 32.5 | 30.1 | - |
| Inedible Marine Oil: | | | |
| Sperm oil: | | | |
| Production . . . . . . . . . . . | 33.3 | 29.0 | 27.0 |
| Opening stocks. . . . . . . . . | 7.1 | 6.0 | 6.0 |
| Exports: | | | |
| Year's total . . . . . . . . . | 16.7 | 10.0 | 6.0 |
| January-July total . . . . . . | 4.6 | 0.1 | - |

1/Not available.

Relatively low hog prices and outbreaks of Newcastle disease, which adversely affected poultry population increases in early 1967, dampened rate of increase in feed consumption and, in turn, requirements for meal. (Agricultural Attaché, U. S. Embassy, Tokyo, Nov. 28, 1967.)

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## SHRIMP FISHING OFF SOUTH AMERICA PROGRESSES SLOWLY

In May 1967, seven Japanese fishing firms were licensed by the Fisheries Agency to operate experimentally 35 shrimp trawlers in the Caribbean Sea off northeast South America. So far, 16 trawlers have been placed in operation. It is reported that full-scale fishing may not begin until March 1968. Operations are being directed toward adjusting fishing gear and selecting fishing methods best suited to that area. Since most Japanese vessel operators are unfamiliar with the shrimping grounds off the Guianas, they are likely to have much trouble in the beginning.

In addition to the 35 newly licensed vessels, 15 other Japanese shrimpers are operating in the Caribbean Sea out of South American bases. ("Suisan Tsushin," Dec. 15, 1967, and other sources.)

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## 2.4 MILLION CASES OF CANNED TUNA IN BRINE SET FOR U. S.

About 2.4 million standard cases of canned tuna in brine for export to the U. S. were contracted for sale to Japanese trading firms during April-November 1967. About 1.8 million cases were whitemeat tuna, and 575,000 cases light meat tuna. Sales reportedly slowed sharply since October, when the Japan Tuna Packers Association raised canned tuna prices.

| Kind of Pack | April-Nov. 1967 Sales By | | |
|---|---|---|---|
| | Sales Company | Outside Packers1/ | Total |
| | . . . . . . . (Standard Cases2/) . . . . . . | | |
| Whitemeat. . . . | 1,737,661 | 995,844 | 1,833,505 |
| Lightmeat . . . . | 508,344 | 66,704 | 575,048 |
| Total . . . . . | 2,246,005 | 162,548 | 2,408,553 |

1/Not members of Export Tuna Packers Association.
2/Standard case--48 $\frac{1}{2}$-lb. cans.

Japanese trading firms, preparing for the 1968 Lenten season, foresee considerable difficulty in selling the product. They anticipate a massive Lenten sales campaign by major U. S. tuna packers, primarily to move holdings of chunk-style lightmeat tuna. ("Suisan Tsushin," Dec. 4, 1967.)

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## TUNA EXPORTS DROPPED SHARPLY IN APRIL-NOVEMBER 1967

Japanese fresh and frozen tuna validated for export during April-November 1967 totaled

Japan (Contd.):

76,193 metric tons, a decline of over 50,000 tons from comparable 1966 exports, according to the Japan Frozen Foods Exporters Association. Exports to the U. S. and Canada were particularly affected--declining over 30,000 tons from the 1966 period.

| Species | U.S./Canada | Overseas Base | Other Countries | Total |
|---|---|---|---|---|
| | . . . (Short Ton) . . . | | . . (Metric Ton) . . | |
| Albacore. . . | 24,353 | 7,939 | 196 | 29,491 |
| Yellowfin . . | 17,224 | 1,421 | 17,561 | 34,478 |
| Big-eye . . . | 402 | 704 | 3,675 | 4,680 |
| Skipjack. . . | 2,688 | 44 | 2,309 | 4,787 |
| Bluefin . . . | - | 3 | 564 | 567 |
| Tuna loins. . | 2,257 | - | 142 | 2,190 |
| Total. . . | 46,924 | 10,111 | 24,447 | 76,193 |
| Apr.-Nov. 1966 Total . . . . | 78,325 | 18,569 | 39,662 | 127,565 |

Albacore was down 12,493 tons and yellowfin 12,130 tons. Loin exports to the U. S. were 2,357 tons, far below the 3,953 tons for comparable 1966. Frozen tuna exports to European and other countries declined 15,000 metric tons, of which 8,000 tons were yellowfin exports. Albacore shipments plummeted to 196 metric tons from 3,145 exported during the 1966 period. ("Suisan Tsushin," Dec. 20, 1967.)

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## TUNA SEINING GOOD IN SOUTH PACIFIC

The Kinkai Hogei Whaling Co.'s purse seiner "Nissho Maru," 253 gross tons, has found excellent fishing off New Guinea between 7° N.-8° N. latitudes. The vessel left Japan Nov. 10, 1967, for the South Pacific and began fishing about Nov. 22. As of Nov. 28, she had landed close to 70 metric tons of yellowfin (44- to 66-pound fish) and skipjack, and was expected to fill her holds in one more set. A carrier was sent to take the vessel's catch.

### New Net Used

This operation has drawn much attention in Japan because 2 years ago another Japanese seiner fished the same area with disappointing results. The recent success is attributed to a new purse seine developed jointly by Taito Seimo Net Manufacturing Co. and the Tokai Regional Fisheries Research Laboratory at a cost of US$22,222.

Because of the rapid current and the deep thermocline in the western equatorial Pacific, the net was built with a larger mesh in the upper section to reduce resistance to the current flow. It was designed for faster sinking to prevent the escape of fish from under the net during setting. ("Shin Suisan Shimbun," Dec. 4, 1967, and other sources.)

* * *

## NEW VESSEL TO SEINE TUNA IN EASTERN PACIFIC

The new Japanese purse seiner "Hakuryu Maru No. 55," 499 gross tons, departed Japan in mid-December 1967 for the eastern Pacific to fish for tuna about 6 months enroute to the Atlantic Ocean. It was built in September 1967 for the fishing firm Kawajiri Gyogyo.

The seiner is scheduled to operate off the California coast until March 1968, seeking bluefin and yellowfin tuna, and then will move southward off Mexico and Central America. Around June, when yellowfin fishing in the Atlantic begins to improve, the vessel will head for the eastern Atlantic to join the Japanese purse-seine fleet off West Africa.

### The No. 55

The "Hakuryu Maru No. 55" is equipped with brine freezing system. To prevent rust and corrosion, the walls in the fish hold are covered with reinforced plastic. Specifications: overall length--48.15 meters (158 feet); width--9.8 meters (32 feet); draft--4.8 meters (16 feet); daily freezing capacity--maximum 96.6 tons, normal 60 tons; fish hold dimensions--approx. 500 square meters (5,380 square feet). ("Suisan Keizai Shimbun," Dec. 11, 1967.)

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## SEINE TUNA IN SOUTHWEST PACIFIC

Four Japanese purse seiners were scheduled to depart Japan in December 1967 for the South Pacific tuna fishing grounds: "Hayabusa Maru" (180 gross tons), "Nissho Maru" (253 gross tons), "Taikei Maru No. 23" (240 gross tons), and "Tokiwa Maru No. 58" (430 gross tons).

The seiners will operate in the South Pacific Ocean from Guam to waters east of New

Japan (Contd.):

Zealand, fishing skipjack and yellowfin tuna. Two other purse seiners licensed for South Pacific experimental operation are not participating at this time.

In late 1966, purse seiners, including the "Taikei Maru No. 23," which is equipped with 2 power blocks, fished for skipjack off Guam with disappointing results. ("Shin Suisan Shimbun Sokuho," Nov. 16, 1967.)

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## 1967 YAIZU FISH LANDINGS DOWN BUT VALUE UP

During 1967, landings at Yaizu, the largest fishing port in Japan, totaled 160,000 metric tons valued at $65.5 million--down 6 percent in quantity but up 4 percent in value from 1966. ("Suisancho Nippo," Jan. 10, 1968, and other sources.)

| Product | 1967 | | 1966 | |
|---|---|---|---|---|
| | Qty. | Value | Qty. | Value |
| | Metric Ton | US$1,000 | Metric Ton | US$1,000 |
| Tuna: | | | | |
| Bluefin1/. . | 59,438 | 37,644 | 64,038 | 35,303 |
| Albacore . . | 26,121 | 11,566 | 21,117 | 10,079 |
| Skipjack . . | 44,259 | 11,443 | 56,762 | 13,125 |
| Mackerel . . | 21,551 | 2,286 | 18,494 | 1,837 |
| Others . . . . | 8,633 | 2,590 | 8,621 | 2,472 |
| Total. . . | 160,002 | 65,529 | 169,032 | 62,816 |

1/Includes yellowfin and big-eyed tuna.

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## FISHERY BUDGET IS UP FOR 1968

On Jan. 12, 1968, the Japanese Government completed its fiscal year 1968 (April 1968-March 1969) budget estimates for submission to the National Diet (parliament). Requests for the Fisheries Agency total about US$78.95 million--6.2 percent over the FY 1967 budget of US$74.36 million.

The FY 1968 budget shows a notable increase in funds for the fishing ground development program. A total of $1.59 million has been requested, compared with $230,000 appropriated in FY 1967. New projects proposed under this program include exploratory work relating to distant-water purse-seining, tuna long-lining, and trawling.

FY 1968 Japanese Fishery Budget

| Program | Proposed FY 1968 Budget | Actual FY 1967 Budget |
|---|---|---|
| | . (In Millions of US$) . | |
| Fishery technological improvement. . | 3.79 | 3 55 |
| Fishing industry disaster compensation system. . . . . . . . . . . . . . . . | 1.95 | 1.45 |
| Artificial reef construction . . . . . . | 1.63 | 1.59 |
| Distant-water fishing ground development . . . . . . . . . . . . | 1.59 | 0.23 |
| Marine resources conservation and development . . . . . . . . . . . . | 1.48 | 1.39 |
| International fisheries biological research. . . . . . . . . . . . . . . . | 0.51 | 0.49 |
| Shallow-water fishing ground development . . . . . . . . . . . . | 0.05 | 0 |
| Other . . . . . . . . . . . . . . . . . . | 67.95 | 65.66 |
| Total. . . . . . . . . . . . . . . | 78.95 | 74.36 |

Another new item in the FY 1968 budget is whale tagging off the coast of Japan. This was proposed under the biological research program for international fisheries. New too is money to install automatic-relay water pollution detection devices in 12 places, and automatic-recording detection devices in 25 places throughout Japan. This is under the Agency's program relating to fishery resource conservation and development. Also, a new $56,000 shallow-water fishery development program has been funded to conduct an engineering survey in Matsushima and Hamanako Bays. ("Suisan Keizai Shimbun," Jan. 15, 1968.)

# Taiwan

## U. S. FIRM INVESTS IN FISHERIES

A Los Angeles firm has invested US$225,000 to form the Pao Hua Marine Products Co. Local Taiwanese participation will be US$525,000. The new company will employ about 200 persons (180 on high seas, 18 in home office) and will fish for tuna in the Pacific, Indian, and Atlantic Oceans.

The estimated annual catch of 3,300 metric tons (worth about US$1.6 million) will be exported to Europe, Japan, and the U. S. The new company's fleet will operate an undetermined number of tuna fishing vessels serviced by a 3,268-ton refrigerated fish carrier. (U. S. Embassy, Taipei, Jan. 12, 1968.)

## South Vietnam

UN AIDS FISHERIES DEVELOPMENT

Under an agreement concluded in Saigon in October 1967, the United Nations will assist South Vietnam in exploratory and experimental fishing operations in offshore waters. Also the commercial feasibility of introducing modern craft and fishing methods, and marketing problems and prospects for sales of increased landings, will be studied. Apart from rice, fish is considered the most important item in South Vietnamese programs to increase food production.

Largest FAO Fisheries Program

The fisheries program is one of the UN's major activities in South Vietnam and the largest of almost 30 current FAO fishery projects. The project will be spread over four years, cost an estimated US$4.2 million, and be administered by the UN's Food and Agriculture Organization. Nearly half (US$2 million) of the total operating fund will be provided by the U. S. under its foreign aid program. ("The Saigon Post," Oct. 21, 1967, and other sources.)

## Communist China

EXTENDS FISHERY AGREEMENT WITH JAPAN

On Dec. 20, 1967, the Chinese unilaterally extended the 1955 Private Fisheries Agreement on the Conservation of Fishery Resources and Safe Fishing Operations in the Yellow and East China Seas. This had been concluded by the Japanese Fisheries Council and China's Fisheries Association.

The agreement has a stormy past. It was suspended in 1958 after "flag incident" at Nagasaki and resumed in 1963. For several months preceding Dec. 20, 1967, it appeared the Chinese had no intention of renewing it. This would have been a severe blow to Japanese fishing: over 700 vessels take more than 300,000 metric tons of fish annually in the area covered by the agreement. After the 1958 suspension, the Japanese vessels were picked up wholesale by the Chinese.

Political Drama

Complications began in August 1967, when a Japanese Fisheries Delegation about to visit Mainland China was suddenly told by the Chinese to stay home. Japan-China relations were strained by the announced visits of Prime Minister Sato to Nationalist China (Taiwan) and South Vietnam. Alarmed, the Japanese Fisheries Council consulted its Government, then sent a telegram to Mainland China probing her intentions. There was no reply. A second message on November 24 also went unanswered. Expecting the worst, the Council tried to induce the Japanese Government to change its policy towards Communist China--but failed.

The Chinese notice of the agreement's extension for 1 year was received favorably by Japan's Fisheries Agency Director (Hisamune), the Taiyo Fisheries Co. President (Nakabe), and other influential persons. Nakabe pressed for additional steps by Japan to better relations with Mainland China (long-term trade agreement).

## South Korea

BERING SEA TRAWL FLEET RETURNS

The South Korean fleet, which operated in the Bering Sea and off Alaska for about 3 months, returned to Pusan in mid-November 1967. The fleet, consisting of the mothership "Sam Su No. 301" (957-gross-ton refrigerated carrier) and ten 100-ton trawlers, was sent to the Bering Sea by the Sam Yang Fishing Co.

Two of the vessels sank in heavy winds off Alaska with a loss of 18 lives.

The landings were only a few metric tons of North Pacific bottomfishes; the rest was eaten by the crew on the return trip.

# SOUTH PACIFIC

## American Samoa

TAIWAN TO START
TUNA SALES COMPANY

Taiwan is reported planning to establish on American Samoa a sales company financed jointly by the Taiwanese Government and the fishing industry. At present, Taiwan operates over 80 tuna vessels out of Samoa.

Tuna landings of the Samoa-based Taiwanese fleet now are sold through the Japanese Taiyo Fishing Co. and the Formosan Marine Products. The proposed company would take over sales and supply procurement for the fleet. ("Suisancho Nippo," Nov. 4, 1967.)

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TUNA PRICE DROPS IN JANUARY 1968

On Jan. 9, 1968, Japanese tuna suppliers and U. S. packers in American Samoa agreed to hold January 1968 tuna delivery prices at the December 1967 levels. During the negotiations, the Japanese initially sought a $5-a-ton increase for yellowfin. They were offered a $5 drop by U. S. packers. Later, they accepted the American offer to continue the December 1967 prices.

In 1967, the Samoa tuna delivery prices continued to decline until May. Then they began to rise gradually but did not reach the levels of a year earlier.

| | January | |
|---|---|---|
| | 1968 | 1967 |
| | . (US$/Short Ton) . | |
| Albacore: | | |
| Frozen. . . . . . . . . . | 372.50 | 390 |
| Iced. . . . . . . . . . . | 357 | 375 |
| Yellowfin: | | |
| Frozen. . . . . . . . . . | 310 | 350 |
| Iced. . . . . . . . . . . | 290 | 330 |
| Big-eyed: | | |
| Frozen. . . . . . . . . . | 185 | 240 |
| Iced. . . . . . . . . . . | 170 | 225 |

The January 1968 prices are $17.50 below January 1967 prices for albacore, $40 below for yellowfin, and $55 for big-eyed. ("Suisan Tsushin," Jan. 11, 1968.)

## Fiji Islands

NEW FISHERY
RESEARCH VESSEL LAUNCHED

A fisheries research vessel for the Fiji Government, named "Gonedau" (Fishermen), was launched recently. The vessel, built by the Fiji Public Works Department, will carry out research and experiment with fishing methods in Fiji waters. ("Pacific Islands Monthly," Oct. 1967.)

# AFRICA

## Senegal

### 1967/68 TUNA SEASON STARTS WELL

The tuna fishing season in Senegal began on Nov. 1, 1967, and the outlook for a good year is favorable. As a result of continued fishing during the offseason, May 15-October 30, this year's tuna season started well. The 5 freezer vessels owned by the Government's Societe Senegalaise d'Armement a la Peche (SOSAP)--and 3 small Basque vessels--caught an estimated 2,500 tons of tuna before this year's season officially started. So Senegal's 3 tuna canneries already have processed over 4,000 tons of tuna. It seems likely that Senegal will be able to fill its export quota to France for the first time since 1961.

#### African Nations Set Quotas

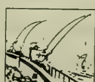
The Interstate Committee for Tuna (representatives of France, Ivory Coast, Malagasy, Mauritania, Congo-Brazzaville, and Senegal) held its annual conference in Paris, Nov. 15, 1967, and fixed quotas for tuna imports into France for the 1967/68 season. Senegal's quota was 10,300 tons, down 700 tons from 1966/67. However, the quota allotment will be reviewed again in March 1968 and may be raised if warranted.

The Committee also raised the price paid fishermen by 5 CFA francs per kg. The price of yellowfin (over 3 kg. size) was set at 87.5 CFA francs per kg. (36 U. S. cents), and skipjack (over 2.5 kg. size) at 60 CFA francs per kg. (24 U. S. cents). Also, Senegal agreed to allow 39 French vessels to participate in Senegal's tuna campaign if they landed their entire catch in Dakar.

#### Hope Seasonal Aspect Will End

The favorable offseason catch has given hope that the industry's seasonal aspect eventually will be eliminated. Next year's offseason plans call for fishing by 8 Basque vessels in addition to the 5 SOSAP vessels in operation. One tuna cannery (probably the smallest) will continue to operate, thus eliminating the great expense of freezing tuna until the regular season begins.

Progress also has been made in the projected expansion of SOSAP's tuna fleet. A source in the Fonds d'Aide et de Cooperation (FAC) has indicated that the financing problems for French tuna boats on order for SOSAP have finally been resolved. Accordingly, it is hoped that some of these vessels, as well as some Soviet-built vessels, will be delivered in time to participate in next year's season. (U. S. Embassy, Jan. 1, 1968.)



### OYSTERS ARE A HISTORICAL DELICACY

History tells us the Roman emperors had fresh oysters transported to their banquets packed in bags of snow, and Pliny says that as early as 95 B.C., one Sergius Orata became the first man to cultivate oysters by growing them on the bottom of Lake Lucrinus. Roman writers such as Horace, Seneca, and Cicero praised the virtues and flavor of oysters. When the Romans invaded England they settled near oyster producing areas.

# INDEX



Index continued page 60.

INDEX (CONTINUED)



## MUSKELLUNGE USED TO CONTROL FISH POPULATIONS

Muskellunge, which are described as a voracious and violent northern game fish, have been introduced into Pomme de Terre Lake in Missouri by that State's Conservation Department. Biologists said 51,000 tiny muskies were released into the lake with the hope they will help control the populations of carp and shad and keep fish populations in better balance. The inch-long muskies were raised from eggs obtained in Pennsylvania and Michigan. About 1,000 will be kept in an attempt to raise brood stock for future experimental work and 8,000 more will be released at Pomme de Terre at a larger size.

Muskellunge

Muskies eat a lot of carp and shad and there are more of these species in the lake than the bass population can handle. An inch-long muskellunge can eat 10 minnows a day. If he can't find a minnow, he will eat another muskellunge.

The violent nature of the muskie is normally exhibited only to other fish. Man appreciates this side of the muskie's character only when he and the fish are at opposite ends of a fishing line. There have been anglers who preferred not to boat a muskie after a long battle unless they first left the boat. The fact that muskellunge can reach weights of more than 100 pounds may explain some of this reluctance to tangle with them on a man-to-fish basis. The current record for rod and reel is 69 pounds, 15 ounces, but the record by any method stands at 102 pounds. (All Outdoors, Missouri Conservation Commission.)

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR

Stewart L. Udall, *Secretary*

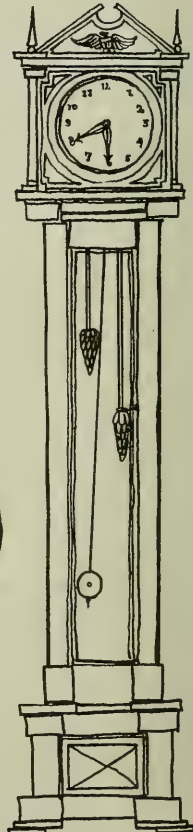
David S. Black, *Under Secretary*

Stanley A. Cain, *Assistant Secretary for Fish and Wildlife and Parks*

FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES, H. E. Crowther, *Director*

# Time For Seafood

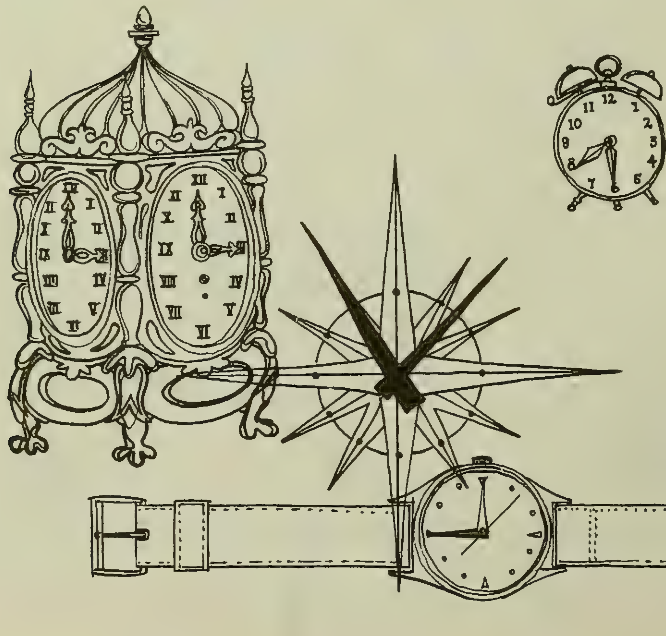


TIME! Where it goes no one knows but go it does, and at breakneck speed despite our best efforts with time-saving plans and gadgets. Keeping an eye on the clock has become as natural as breathing yet we see time racing away as the list of "things to do" grows.

The Bureau of Commercial Fisheries says there is time--TIME FOR SEAFOOD. Today's homemaker will find efficient, exciting new fish and shellfish recipes in the new Bureau publication, "TIME FOR SEAFOOD". Prepared in only a few minutes, each recipe is the basis for a quick, complete meal.

The Bureau will distribute copies of this publication plus food photographs and suggested copy to the news media during the Lenten season to help them guide the hurried homemaker and to show her a way to take the edge off the "what's for dinner?" nerves.

Copies of "TIME FOR SEAFOOD", G.P.O. Catalog No. I 49.49/2:12, are available for 45 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.



# COMMERCIAL FISHERIES Review

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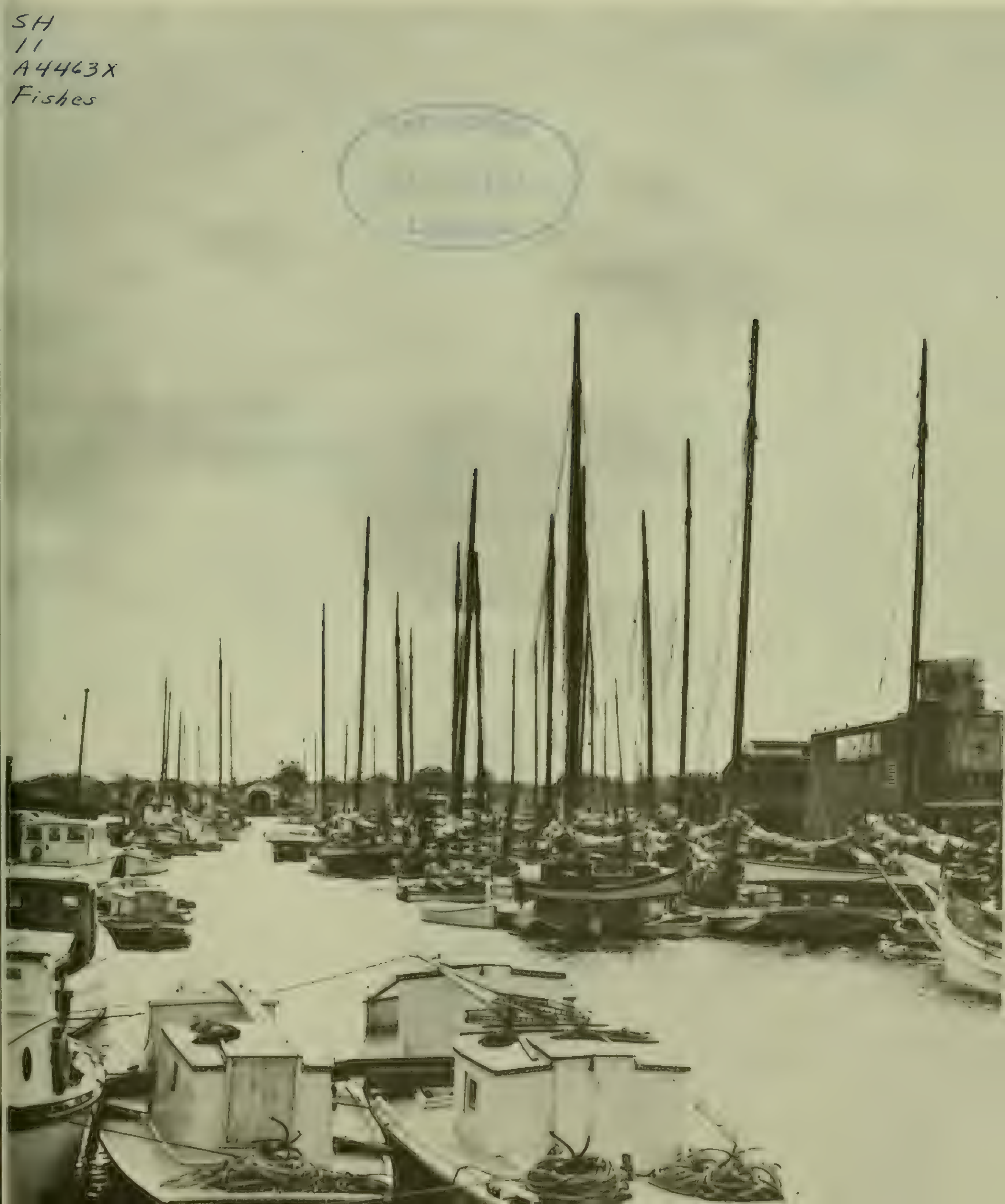

COVER: Fishing fleet at Annapolis, Md.
(Authenticated News)

# *COMMERCIAL FISHERIES*

## *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.


FISHERMEN'S MEMORIAL--GLOUCESTER, MASS.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)
and Mary Andrews

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209. Telephone: Area Code 703 - 557-4246.

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# CONTENTS

Massachusetts Fisherman.
(Standard Oil of N. J.)

# 1967 U. S. SHRIMP LANDINGS SET RECORD

The shrimp was the most valuable species to U. S. fishermen in 1967. Landings of 313 million pounds (heads on) were worth $102 million--a record quantity and value. The previous high catch was 268 million pounds in 1954.

Shrimp is the first marine fishery resource to attain a value of more than $100 million to domestic fishermen.

The 1967 landings were up 80 million pounds and more than $6 million over 1966. All shrimp-producing areas, except the South Atlantic, registered gains.

Maine, Alaska, and Oregon achieved much greater percentage increases in landings than other areas; records were set in the three States.

The Southern States contributed 79 percent to the total--down from 84 percent in 1966.

GULF OF MEXICO

Landings at Gulf of Mexico ports rose 45 million pounds. This increase was produced by a record supply of the brown species in the northern Gulf off Louisiana and Texas. Landings were heavy during the summer, the peak of the brown shrimp season. Nearly half the 1967 Gulf shrimp catch was landed during June, July, and August. During 1957-66, only 35 percent was landed during these 3 months.

In September, Hurricane Beulah paralyzed fishing and damaged many vessels (some were destroyed) and shore establishments. Major damage centered in the area of Pt. Isabel-Brownsville, Texas, an important shrimp production center, but a wider area was affected. (BCF Branch of Fishery Statistics.)

△ △ △ △ △

# UNITED STATES

## Set 1968 Tariff Rates for Groundfish Fillet Imports

The reduced-tariff-rate import quota on fresh and frozen groundfish (cod, haddock, hake, pollock, cusk, and ocean perch) fillets and steaks for 1968 is 24,894,900 pounds. This was announced by the Bureau of Customs in the Feb. 7, 1968, "Federal Register."

During each quarter of 1968, 6,223,725 pounds of groundfish fillets and steaks may be imported at the $1\frac{7}{8}$ cents-per-pound rate of duty; imports over the quarterly quota will be dutiable at the rate of $2\frac{1}{2}$ cents a pound.

Quantity Increased 25% in 1951-1960

The reduced-rate import quota for 1968 changed only slightly from the 1967 quota of 24,883,313 pounds. From 1951 to 1960, the quantity of fresh and frozen groundfish fillets permitted to enter the U. S. at reduced duty rate of $1\frac{7}{8}$ cents a pound had increased 24.7 percent. In 1961, however, the trend was reversed significantly for the first time. It occurred because in 1960 frozen fish fillet blocks with bits and pieces had become no longer dutiable under tariff category "frozen groundfish fillets."

Kennedy Round Concessions

U. S. concessions granted in the 1964-67 Geneva trade conference (Kennedy Round) reduced the duty rate on fish blocks (with bits and pieces) from 1 cent a pound to 0.8 cent a pound on Jan. 1, 1968.

Concessions on fish blocks are being put into effect in 5 equal annual stages. The final reduction will become effective Jan. 1, 1972. Then fish blocks will be duty free.

## 1967 U. S. Salmon Landings Were Way Down

Preliminary records indicate the 1967 U. S. catch of salmon of 204 million pounds was down 184 million from 1966. It was 96 million less than the annual average during 1957-66. A big drop in Alaska landings was offset partially by a significant increase in Washington and Oregon. During 1967, landings in Washington, Oregon, and California were 73 million pounds, an increase of nearly 19 million from 1966--and nearly 22 million pounds above the average yearly catch during 1957-66.

The 1967 Alaska salmon catch was a failure: landings of 131 million pounds were the lowest since 1899. The catch was 61 percent less than 1966, and 47 percent lower than the average for 1957-66. Yearly records of total catch are available since 1865, but a listing by species was first recorded in 1906. Over the years, the pink species has dominated the Alaska salmon catch. It was followed closely by red (sockeye). Both species made up $\frac{3}{4}$ percent of the total salmon catch. For the 61-year period, 1906-66, Alaska salmon landings were: pink 43%, red (sockeye) 33%, chum (keta) 16%, silver (coho) 5% and chinook (king) 4%.

Pink Salmon At Record Low

The 1967 Alaska catch of pink salmon was 27 million pounds--a record low. It was only one-fourth the average yearly landings during 1957-66. The previous low catch of pink salmon was close to 31 million pounds in 1906, the first year data were collected. Pink salmon landings of less than 50 million pounds occurred in 1906-07, 1909-10, 1920, and 1959. Alaska's 1967 landings of red (sockeye) salmon of 52 million pounds were 18% lower than 1957-66 average. The previous low catch was nearly 36 million pounds in 1963. Red salmon landings of less than 50 million pounds occurred in only 4 years--all since 1954. The 1967 catch of chum (keta) was 29 million pounds, the same as in 1965. It was 40% less than the previous 10-year average. Silver (coho) landings were 12 million pounds, 4 and 2 million less than 1966 and the 1957-66 average, respectively. The previous low silver catch was in 1960--10 million pounds. Landings of king (chinook) in Alaska during 1967 were 10 million pounds--one million above 1966 but about the average annual quantity during 1957-66. (BCF Branch of Fishery Statistics.)

## 1967 U. S. Fish Meal, Oil, and Solubles Production Declined

According to BCF, U. S. production of fish meal, oil, and solubles during Jan.-Dec. 1967 and 1966 was:

| | Jan.-Dec. | |
|---|---|---|
| | 1/1967 | 1966 |
| | . . (Short Tons) . . | |
| Fish Meal and Scrap: | | |
| Alewives | 4,508 | 3,746 |
| Groundfish | 7,909 | 6,311 |
| Herring | 9,273 | 11,850 |
| Menhaden2/ | 119,125 | 134,954 |
| Tuna & mackerel3/ | 32,447 | 29,758 |
| Unclassified | 12,157 | 24,728 |
| Total fish meal & scrap | 185,419 | 211,347 |
| Shellfish meal & scrap | 4/ | 11,773 |
| Grand total meal & scrap | 4/ | 223,120 |
| Fish Solubles: | | |
| Menhaden | 51,536 | 60,769 |
| Unclassified | 22,155 | 22,672 |
| Total solubles | 73,691 | 83,441 |
| | . . (1,000 Lbs.) . . | |
| Oil, body: | | |
| Alewives | 1,827 | 5/ |
| Groundfish | 1,348 | 536 |
| Herring | 5,078 | 7,862 |
| Menhaden2/ | 98,449 | 144,198 |
| Tuna & mackerel3/ | 6,210 | 4,884 |
| Unclassified (inc. whale) | 6,711 | 6,565 |
| Total oil | 119,623 | 164,045 |

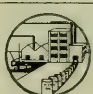
1/Preliminary data.
2/Includes a small quantity of other species.
3/Includes anchovies.
4/Not available on a current monthly basis.
5/Included with unclassified.

U. S. Foreign Trade

The Bureau of the Census reported the following U. S. foreign trade in selected industrial products for Jan.-Dec. 1967 and 1966:

| | Jan.-Dec. | |
|---|---|---|
| | 1/1967 | 1966 |
| | . . (Short Tons) . . | |
| Imports: | | |
| Fish meal & scrap | 651,486 | 447,784 |
| Fish solubles | 3,669 | 4,308 |
| | . . (1,000 Lbs.) . . | |
| Whale oil, sperm (crude & refined) | 51,318 | 58,166 |
| Exports: | | |
| Fish & fish-liver oils | 76,816 | 77,254 |
| Whale & sperm oil | 1,787 | 4,356 |

1/Preliminary data.



## U. S. Fish Meal Prices Strongly Affected by Peru's 'Sole' Devaluation

The 32% devaluation of Peru's "sole" in September 1967 affected U. S. fish meal prices much more than did Peru's fisheries promotion law of Oct. 6, 1967. This was reported by BCF's Branch of Current Economic Analysis.

The promotion law reduced or eliminated export taxes by about $7 per ton of fish meal. The devaluation reduced the cost of fish meal by about $41 per ton. Together, these gave Peruvian producers about a $48 advantage.

U. S. prices of Peruvian fish meal have dropped about $12 per ton since Oct. 1, 1967. This would mean that Peru's industry is using about three-quarters of the cost reduction to improve its financial situation.

## Georges Bank Survey Shows More Cod, Fewer Haddock

The preliminary results of a BCF groundfish survey in the Georges Bank area show somewhat more cod and fewer haddock than usual. The survey provided an estimate of the strength of the 1967-year class of haddock. Almost none was found. This indicates 1967 is one of the weakest year-classes ever measured.

It is bad news for the New England haddock fishery because it is the fourth consecutive poor year-class. Since 1963, which produced the record year-class, there has been poor survival of spawn. The 1963 year-class was overfished by the U. S. and foreign countries in 1965 and 1966 and so cannot maintain the yields of the past 2 years.

Haddock landings will continue to decline for at least 2 more years.

## New World Whaling Rules to Bring U. S. Changes

Following recent changes in regulations by the International Whaling Commission (IWC), the U. S. Department of the Interior has proposed to amend U. S. rules to make them conform to the IWC's. ("The Federal Register," Feb. 9, 1968). Only one U. S. firm catches whales.

The proposed change will prohibit commercial whaling for North Atlantic blue whales before 1970 and humpback whales before 1969. There is an exception to the latter: small vessels in Greenland waters may take 10 humpbacks.

Humpback whale.

In the North Pacific and dependent waters, neither blue nore humpback may be taken before 1971.

Whaling Convention & Commission

The International Convention for the Regulation of Whaling has been signed by 16 nations, which are all represented on the Whaling Commission. The Commission meets every year to determine the status of whale resources. From time to time, it amends regulations to protect and conserve these resources.

At present, 4 species have nearly complete protection from commercial operations: right, blue, gray, and humpback. For other species, there are controls on seasons when they may be harvested and on sizes of whales.

## U. S. and 4 States Plan Lake Michigan Cleanup

Officials of Interior Department's Federal Water Pollution Control Administration (FWPCA) and 4 states bordering Lake Michigan--Michigan, Illinois, Wisconsin, and Indiana--are meeting in Chicago, Ill., in March to draft a plan to clean up the lake.

Murray Stein, chief enforcement officer for FWPCA, presided at a February meeting of these officials in Chicago. He reported substantial agreement on pollution causes and on what the U. S. and the states have to do. He made clear that an adequate program would cost industry and local, state, and Federal Governments hundred of millions of dollars. But the alternative, he said, was a fate for Lake Michigan similar to that of Lake Erie, which is now almost beyond help.

Pollution Sources

The conferees agreed in February that the major pollution sources included inadequately treated municipal and industrial wastes--and combination sanitary and storm sewers. They listed too: dumping of polluted harbor dredgings, waste from water craft and chemical nutrients, such as nitrogen and phosphates. These chemicals cause algae and other undesirable forms to grow.

Remedies Proposed

There was general agreement that at least 90 percent of the impurities must be removed from municipal and industrial wastes. Also, waste water must be rid of phosphates before reaching the lake. And uniform testing and sampling of water quality must be established.

The conferees are confronted by the problem of obtaining the money they need. They also must agree on deadlines for ending certain types of pollution.

Udall Promises Support

The February conference was called by Interior Secretary Stewart L. Udall. He urged development of a program to save Lake Michigan from an "ugly, useless death." He promised to support fully the ultimate recommendations.

## Promote Halibut to Overcome Depressed Market

The Halibut Association of North America is planning a national promotion campaign to aid the halibut industry. North Pacific halibut prices have declined despite a 1967 production of 7.4 million pounds below previous years. Competition from imports is a large part of the problem--particularly from Greenland halibut fillets.

The Association will emphasize 10 major markets: New York, Boston, Philadelphia, Chicago, Los Angeles, San Francisco, Washington, D. C., Baltimore, Minneapolis, and Pittsburgh.

### BCF Will Help

BCF will assist in the promotion campaign by asking the U. S. Department of Agriculture to include halibut steaks on its Plentiful Foods List for April. It will try to get radio and TV public-service time to supplement paid advertising by industry. And BCF will encourage retailers to emphasize sales of domestic halibut steaks.

## New Loran Stations in Gulf of Mexico

Two new loran stations--one near Brownsville, Texas, the other near Biloxi, Miss.--will enable U. S. fishermen to plot their positions from the stations to within $\frac{1}{2}$ mile at 800 miles and $1\frac{1}{2}$ miles at 1,400 miles. They will know their distance from the Mexican coast. The stations also will help Mexican enforcement of fishing limits and territorial waters.

Receiving sets for vessels cost US$120. The Mexican authorities probably will buy sets for their enforcement vessels. The U. S. and Mexico have agreed on frequencies to use and the U. S. Coast Guard is poised to operate the stations.

## Study Effects of Warmed Columbia River on Living Things

The Department of the Interior has announced a 2-year study on the biological effects of sending heated water back into the Columbia River. The $600,000 project is the first study of all aspects of thermal effects on the aquatic environment. The study will be conducted by Interior's Federal Water Pollution Control Administration (FWPCA).

The investigation was prompted by inconsistencies in the water-quality standards of Washington State and neighboring Oregon on temperature changes to be allowed in the Columbia. The study's chief aim is to provide a scientific basis for determining permissible variations in stream temperatures above natural levels.

### What Study Involves

The investigation will use information from a mathematical model now being developed to forecast temperature changes in the Columbia resulting from varying heat inputs. The study will enlarge the mathematical model to include the entire river from Canada to the Columbia's mouth at Astoria, Oregon.

A first major step will be to determine the relationship between nitrogen levels and temperature and this combination's effects on anadromous and resident fish. BCF laboratory evidence indicates that the combination of excessive amounts of nitrogen gas and temperature changes can cause fish kills akin to divers' "bends." As water passes through dam spillways, it tends to pick up nitrogen gas from the atmosphere. There are other causes of nitrogen supersaturation; an important one is increases in water temperature.

### Cooperative Undertaking

BCF will join FWPCA in the study. A scientific and technical advisory committee on heat effects on flora and fauna will be appointed by Interior Department to assist. Invitations will be sent to Washington, Oregon, Idaho, and Montana; the Atomic Energy Commission, the Bureau of Sport Fisheries and Wildlife, the Corps of Engineers, the Bonneville Power Administration, and the Bureau of Reclamation. The present task force on mathematical model studies will carry on.

"The results of this study are certain to have a major bearing on the whole unsettled question of thermal effects," Interior Secretary Udall said.

## Lake Erie Commercial Catch Was Down in 1967

The 1967 commercial catch in Lake Erie was about 48 million pounds, down 6 million pounds from 1966. There were smaller catches in Canadian waters and in the 4 State areas. The 1967 figure was about average for the past 50 years.

There is real concern about further decline of fishing in U. S. waters. During the past few years, several fish companies have gone out of business. Nets and equipment are being advertised for sale, but there are few takers. Most fishermen are discouraged by the outlook. Fishing along Lake Erie's south shore has become a minor business. Little is being done by industry or administrative agencies to reverse this trend.

Commercial fishing in Lake Erie has become primarily a Canadian operation.

## President Asks for Fish Inspection Act

On February 6, President Johnson asked Congress to legislate inspection of fish and fishery products. It was one of eight items in his fourth Message on the American Consumer.

The part of the President's message to Congress dealing with fish said:

"Wholesome Fish"

"If poultry inspection is spotty today, fish inspection is virtually non-existent.

"Each year, Americans consume about two billion pounds of fish--nearly 11 pounds per person. A common item in every family's diet, fish can also be an all-too common carrier of disease if improperly processed and shipped.

"Last summer, the Senate Sub-committee on Consumer Affairs heard testimony which disclosed that a substantial amount of the fish sold in this country exposes the consumer to unknown and unnecessary dangers to his health.

"It is impossible to show every link between contaminated fish and illness. Yet these links do exist: links to botulism, hepatitis, and other diseases. About 400 cases of food poisoning, reported on a single weekend in 1966, were traced to fish processed in dirty plants.

"Despite these facts, the Nation has no adequate program for continuous fish inspection--either at the Federal or State level. Nor is there any systematic program for inspecting imported fish and fish products, which account for more than 50 percent of our annual consumption.

"I propose the Wholesome Fish and Fishery Products Act of 1968.

"The bill would authorize the Secretary of Health, Education, and Welfare to:

-- Develop a comprehensive Federal program for consumer protection against the health hazards and mislabeling of fish, shellfish and seafood products.

-- Set standards and develop continuous inspection and enforcement.

-- Support research, training, and inspection programs.

-- Help the states develop their own fish inspection programs.

-- Assure that imported fish products are wholesome."

BCF Would Help Industry

Shortly after the President's message, the U. S. Department of the Interior sent to the Senate and the House of Representatives a draft of proposed legislation "to provide technical and financial assistance to the commercial fishing industry in meeting the requirements of the Wholesome Fish and Fishery Products Act of 1968."

# OCEANOGRAPHY

## Seismic Survey Planned for East Coast

Interior Department's Geological Survey plans to permit the Continental Oil Company (CONOCO) to conduct a geophysical seismic survey of the Outer Continental Shelf--from Florida waters through the Georges Bank area. The permit will be effective from March 2 until October 1.

The company will use the nonexplosive vibroseis seismic device. It will share information gained from the survey with 14 other oil companies. BCF has advised the fishing industry.

CONOCO is required to keep BCF Regional Directors informed weekly of its operating schedule. When it reaches Georges Bank, it will notify BCF by phone of any schedule changes between weekly reports.

CONOCO has invited BCF and any other interested groups to observe the shooting operations.

## Scripps Vessel Begins Bering Sea Research

A research expedition to study how arctic fishes and mammals survive their frozen habitat--and why spawning salmon suffer from a degenerative disease of the arteries--is under way in the Bering Sea. From early March through late September, the 133-foot, 300-ton "Alpha Helix" of the Scripps Institution of Oceanography will be base and laboratory for 50 scientists from 5 nations. BCF is one of 25 participating organizations. The research program is being financed by $574,000 in grants from the National Science Foundation.

Principal investigator for the expedition is Dr. Per F. Scholander, professor of physiology at Scripps and director of its physiological research laboratory.

### What They Seek

One reason for the expedition, Dr. Scholander said, is to determine how practical it is to conduct scientific biological and physiological research in that area using the shelter of floating ice to obtain a steady laboratory. Also: "We want to know more about the defense mechanism that fishes have against the interior freezing of their bodies. They have some sort of an inbred anti-freeze, probably combined with some unknown physical mechanism. In arctic marine mammals, the flukes are ice-cold but the rest of their body is warm. How can they conserve body heat under such conditions? . . . . We'll study the respiratory efficiency of gills and microcirculation of fishes living in this frigid environment. We hope to learn how the tissues of a reindeer's antlers grow under such cold conditions. Why are we and Eskimos so sensitive to snowblindness, when arctic mammals and birds are not?"

### Salmon Research

The salmon studies will be conducted at Bella Coola, British Columbia. Dr. Andrew A. Benson of Scripps, senior scientist for the salmon research, commented that as the spawning salmon swims from the ocean into and up fresh-water streams, the walls of the arteries leading to the heart muscle become thicker. This reduces circulation to the heart and starves it of oxygen.

"The same situation occurs in human beings suffering from atherosclerosis," he said. "We will study the biochemical and physiological situations in the salmon that are analagous to those in human beings. At this point, no one knows why the walls thicken. We hope our study will help provide some answers." Salmon from the ocean and from fresh water will be studied.

Several scientists in Benson's party have conducted extensive studies with human patients having atherosclerosis, and they will be seeking similar conditions in salmon.

### Spawning Salmon Under Stress

In the spawning situation, the salmon is under stress, Dr. Benson explained. There

is a relationship between stress and atherosclerosis, so the salmon will be studied for biochemical and physiological changes that occur under stress. There is some indication that similar changes occur in human beings. Dr. Benson said that stress involves the liberation of fats, such as phospholipids and cholesterol, into the blood. There they circulate and settle in various places--such as the fatty plaques that accumulate on aorta walls in people.

"As far as we know, a salmon doesn't develop this problem," Dr. Benson said. "In the salmon, the cholesterol is kept in solution in the blood and not allowed to attach itself to arterial walls. Our studies will include analysis of the lipid content in the blood for indications of how this condition might differ in the salmon."

## LASER Beam Can Aid Hurricane Forecasting

The ocean surface can be profiled from the air with a new method being tested by the U. S. Naval Oceanographic Office (NOO), Suitland, Maryland. NOO scientists are using a recently developed helium neon laser system to analyze ocean waves that are too small or too fast to be measured by usual methods. Development of the new method makes possible observational programs that can provide a basis for accurate forecasts of hurricane wave conditions.

## Survey Fixes Navigational Hazards Along N. J. Coast

A hydrographic survey by the Coast and Geodetic Survey of the New Jersey coast from Sandy Hook to Cape May has pinpointed the presence of many sunken wrecks, piles, and other navigational obstructions. It disclosed a sunken wooden barge not visible on the surface but close enough to endanger boats passing over it--on the south side of the channel between Barnegat Inlet and Bay. It also verified or disproved many charted wrecks. A spokesman explained that some have washed or rotted away or were removed over the years.


The survey could not find, or found submerged, many piles--such as poles used to anchor boats, or as a foundation for fishing huts, or as private navigation markers. Many existing piers were found in ruins, including the seaward end of a 650-yard pier at Atlantic Highlands. The Coast Survey termed the piers a hazard to small boats.

Depths of Waterways Determined

Accurate depths were determined in the following waterways: Meteconk, Manasquan, Shark and Navesink rivers; Blackberry, Parker, Town, Little River and Troutmans creeks; and smaller waterways in the area.

Many new landmarks found will provide valuable aids to mariners navigating the New Jersey inland waterways. Existing landmarks also were evaluated from the sea to determine their value to marine navigation. Part of Toms River was included in the survey.

The results have been incorporated in new editions of Coast Survey charts 824-SC and 826-SC issued in February 1968.

## First Hydrographic Survey in 40 Years Begins in South Puerto Rican Waters

ESSA's Coast and Geodetic Survey began in February a long-range program to survey the entire south coast of Puerto Rico and its offshore waters. It is the first in 40 years. The "Whiting," a 760-ton, 162-foot vessel, is conducting a 3-month hydrographic survey of the 225-square-mile coastal and offshore area between Cabo Rojo and Punta Jorobado.

The Survey's results will be incorporated into new nautical charts planned by the Coast Survey. The charts will benefit commercial shipping, recreational boating, sport and commercial fishing, and ocean research. They will help Coast Guard locate and establish aids to navigation along Puerto Rico's south coast.

Preparations for Survey

In preparation for the hydrographic surveys, color aerial photos were taken in February 1967. From these, shoreline and alongshore features were mapped. The photos and maps will be used to locate signals which will position accurately the survey launches, and to identify underwater dangers.

## South Pacific Is Deeper, More Mountainous Than Thought

The bottom of the South Pacific, barely explored until recently, has many more undersea mountains and plateaus than previously reported, discloses the Environmental Science Services Administration (ESSA) of the U. S. Department of Commerce. Many parts of the South Pacific, deeper than formerly thought, are marked with unusual, still-unexplained features. These include giant fractures of the ocean floor that extend in a north-south direction, rather than east-west, as such splits do in the North Pacific bottom.

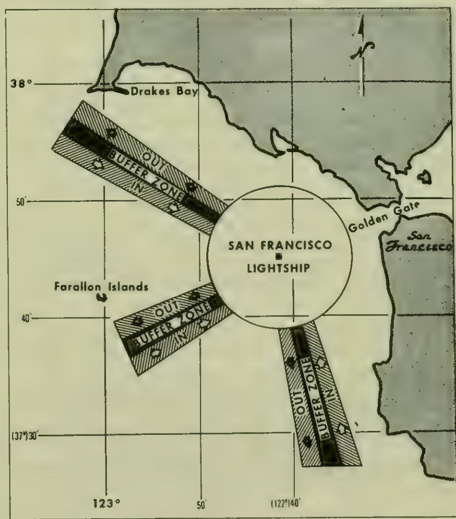
"Oceanographer's" Work

The discoveries are based on data gathered by ESSA's oceanographic survey ship Oceanographer during its global cruise. The data are being processed and studied by scientists in the U. S. and abroad. The task will take years.

The ship's electronic equipment obtained a continuous profile of the bottom. The equipment includes sonar and geophysical devices that plumb the bottom and the rock beneath it. Satellite navigation, with precise depth soundings from a narrow-beam echo sounder, provided a very high degree of accuracy.

## Coast Guard to Set Up 'Divided Highway' for San Francisco Waters

The Coast Guard has approved a Sea Lanes system for San Francisco designed to reduce the chance of ship collision in the approaches to San Francisco Bay. It will start in June. The San Francisco plan is similar to those in New York and the Delaware Bay. The Sea Lanes are two one-way lanes separated by a "buffer zone"--much like a divided highway for road traffic.




The Coast Guard is encouraging foreign and domestic steamship lines to use these new, voluntary, safety lanes.

A circle with a radius of 6 miles will be established around the San Francisco Lightship at the Bay's entrance. The new Sea Lanes will fan out from the circumference.

The Coast Guard believes that use of the new safety lanes will reduce the number of head-on-meetings and close-passing situations generally known to create the greatest danger of collision. The basic chart of the area (Coast and Geodetic Survey Chart #5072) will be reprinted in June and include these new Sea Lanes.

## New Book Portrays Oceans' Promises and Challenges

Man has relatively little knowledge of the oceans, but this mystery may not continue for long, suggests Dr. John E. Bardach of the University of Michigan in his new book: "Harvest of the Sea" (316 pp., $6.95, Harper and Row, N. Y.).

Bardach says: "Our knowledge of the oceans, though still very incomplete, has grown by leaps and bounds since Challenger's return to port. [Britain's H. M. S. Challenger conducted first genuine oceanographic expedition less than a century ago.] We now view the sea as a dynamic system that has interplay with the atmosphere above as well as with the earth's crust below. Her tides ebb and swell in the estuaries of our rivers. These in turn drain the land, carrying salts, silt, and (after heavy rains) precious soil down to the sea."

And the cycle goes on: "Evaporation from the sea is the source of most of the rain that falls on the land, and the water that flows downstream as a result is but one link in the all-important cycle that transports water molecules--to state the process as simply as possible--from ocean to clouds to rain or snow to soil to lake or river and then back to the sea."

Bardach says that oceanographers face enormous research tasks. While echo-sounding devices that permit the profiling of the sea bottom have been available for years, "the ocean is so vast that at present there do not exist detailed charts even for all inshore areas, to say nothing of the deep ocean basins."

Today, SCUBA (self-contained underwater breathing apparatus), diving saucers, atomic submarines, and bathyscaphes afford a better view of the mysterious underwater world. But, says the author, the great needs are time, study, and money--mostly money.

To Help Feed World

Perhaps the sea's greatest importance, Bardach states, is that its own inhabitants can supply all-important proteins to the earth's inhabitants.

"There is hardly a sea animal that cannot be eaten after proper preparation. Yet we utilize but a small number of all species of animals that make their home in the sea. Of the 25,000 or more existing species of fish we capture consistently for food only about 200. Of the mollusks such as clams and oysters, and of the crustaceans, including shrimp, we use proportionally even less."

Much more light must be shed on harvesting sea life. Bardach explains: "Fishing today is still the stalking of an invisible quarry. Even on the vast commercial scale practiced by the Japanese and Russians, it amounts simply to the taking of nature's surplus. As yet we can do almost nothing to influence the abundance of most marine animals and, beyond certain limits, animal populations cannot be exploited without depleting them."

While some whales and fish stocks have been overharvested, other species are largely untouched, the author points out. The abundant hakes of the North Atlantic, for example, remain beyond present fishing tools.

Other Ocean Wealth

The great continental shelves may contain as many mineral deposits as dry land. There are many possibilities for producing food and other materials--from seaweed cosmetics to sponge-produced antibiotics.

The domestication of land plants and livestock was "one of the most momentous of human cultural advances. Marine plants and animals have really not yet been subjected to the combination of science and husbandry skills that could now be brought to bear on them."

Bardach concludes: "Gathering knowledge about man's interaction with the sea, and truly beginning to understand it, should help us guard against the kind of mistakes we made on land."

## Foreign Fishing Off U. S. in January 1968

IN NORTHWEST ATLANTIC

Sixteen foreign fishing vessels (15 Soviet and 1 Polish) fished off southern New England and New York during January. This compares with 19 in December 1967; the 19 included vessels from East and West Germany.

Soviet: The number of vessels increased from about 6 stern trawlers early in the month to 12 by month's end. This was first evidence of increased activity since October 1967. In late January 1967, only a few vessels (believed doing exploratory fishing) were sighted off southern New England.

Throughout January, the vessels were dispersed widely in small groups along the 100-fathom edge of the Continental Shelf--from south of Montauk Point, Long Island (between Hudson and Block Canyons), to areas south of Nantucket Island off Massachusetts. Moderate catches observed on board several vessels appeared to be whiting (silver hake) and red hake.

One or two stern trawlers were reported fishing off Virginia. Catches were not determined.

A factory stern trawler ("Atlantik" class) made debut in Northwest Atlantic. The vessel, "Peter Lizyukov 7117," fished off southern New England and New York.

Polish: Late in January, one stern trawler was sighted among Soviet vessels off southern New England. No catches were observed. Possibly, the Poles are showing some interest in red hake for the future. From August to November 1967, sizable fleets fished heavily for herring on Georges Bank and southern New England. This ended in late November 1967.

East & West Germany: No sightings reported.

Soviet Violations of Mid-Atlantic Agreement: The U. S.-USSR Mid-Atlantic Fisheries Agreement, signed Nov. 25, 1967, has required expanded enforcement and surveillance efforts. These are conducted jointly by the U. S. Coast Guard and BCF.

In January, 5 separate violations of the treaty area, involving 5 individual Soviet vessels, were observed. In each case, between 1 and 3 vessels were fishing actively inside the east boundary of the "no fishing" treaty area. Catches on board several vessels were identified as whiting and red hake.

IN GULF OF MEXICO

No foreign fishing vessels were sighted during January. Soviet vessels continue to transit southward to their fishing grounds off South America. They use the Havana fishing port as supply base. Scattered vessels were seen on Campeche Banks, probably doing exploratory research.

OFF CALIFORNIA

Soviet: No vessels were sighted in January. In January 1967, only a few vessels fished off California.

OFF PACIFIC NORTHWEST

Soviet: Fishing was limited. Only 5 different vessels were sighted: 3 factory stern trawlers (BMRT's), 1 medium refrigerated side trawler (SRT-M), and 1 refrigerated transport. Three of the vessels were research or exploratory types--assumed searching for winter concentrations of fish for the fleet.

Only one vessel (the research vessel "Ogony") was observed on January 30 off the Columbia River with fish (about 1,000 pounds of Pacific ocean perch), although others were fishing. Fishing effort in January 1968 was about the same as in January 1967.

Japanese: Three stern trawlers operated off U. S. Pacific Northwest coast, but only during part of January. Early in month, all 3 were present; by mid-month, only 2 remained; by month's end, only one. Pacific ocean perch (about 8,000-10,000 pounds) were seen on one deck.

OFF ALASKA

Soviet: The number of vessels fishing increased from about 75 in early January to about 110 at month's end. This increase resulted from buildup of flounder fleet in eastern Bering Sea, and beginning of herring fishing in central Bering Sea.

The Soviet Pacific ocean perch fishery in the Gulf of Alaska was confined to coast of southeastern Alaska in eastern Gulf throughout January. The number of vessels increased from 15 factory stern trawlers (BMRT's), 1 medium refrigerated side trawler (SRTM) and 1 base ship in early January--to 15 BMRT's, 2 SRTM's, 1 base ship, 1 tanker, and 2 other vessels by month's end. In previous years, SRT side trawlers were primary fishing vessels. During previous winters, 50-100 side trawlers were active in the Gulf.

While the number of vessels now used in the Gulf is considerably less than in previous years, the fishing capability is about the same. This is because catch rate of present vessels is three times that of smaller side trawlers.

The flounder expedition in the eastern Bering Sea, which began December 1967, increased from about 50 vessels in early January to about 70 by month's end. Soviet sources reported about 400 metric tons were caught each day in eastern Bering Sea in first 10 days of January. Presuming that about 40 of the 50 vessels in early January were trawlers, this would mean a daily catch of 10 tons per trawler.

Soviet sources reported that an SRTM was dispatched to central Bering Sea in early January to explore for herring. In mid-January, the vessel caught 20 tons of herring in one day. It was joined by "columns" of large fishing vessels (presumably BMRT's). Also, daily catches of individual BMRT's exceeded 30 tons. At least a dozen trawlers engaged in this fishery in January.

A fleet of 6-12 SRTM freezer trawlers engaged in deep-water trawling north of Fox Islands in eastern Aluetians. Similar expeditions were conducted by SRTM's in this area in 1967. Observed catches were primarily sablefish and arrowtooth flounder.

Japanese: The number of vessels off Alaska dropped from about 50 in early January to about 35 just after mid-month, and then increased to about 44 at month's end.

The Gulf of Alaska ocean perch fishery was continued at a low level. This has been pattern of previous winters. The Japanese effort, like the Soviets', was confined to eastern Gulf throughout January. Two factory trawlers fished off southeastern Alaska coast and two on Yakutat grounds during most of January. At month's end, only one vessel was fishing. Joining her was another factory trawler. Also arriving at month's end was a small factory trawler that began fishing on Yakutat grounds.

Four factory vessels, accompanied by about 38 trawlers, fished in eastern Bering Sea during first half of January. These fleets fished primarily on and along edge of Continental Shelf, just north of Unimak Island. They caught Alaska pollock, gray cod, and flounders, which were processed primarily by freezing. About mid-month, 2 fleets returned to Japan. The 2 remaining fleets shifted to Alaska pollock grounds north of Fox Islands in eastern Aleutians where they remained for rest of month. By January's end, one factory trawler had returned from Japan and began operations southeast of Pribilof Islands. It was accompanied by about 8 trawlers that caught Alaska pollock and flounder.

Early in January, 3 independent factory trawlers fished on Continental Shelf just north of Unimak Island. They caught flounders (yellowfin soles), which were frozen. By mid-month, they had been joined by 2 more factory trawlers; all 5 fished along 100-fathom curve between Unimak Pass and Pribilofs. They caught mainly Pacific ocean perch. These vessels continued fishing during remainder of month; late in January, they were joined by another trawler.

Six Japanese long-line vessels fished for sablefish in the Gulf of Alaska. During first 3 weeks, 2 long-liners fished off southeastern Alaska, and one was located off Kodiak Island. Late in January, the latter vessel moved to off southeastern Alaska, and the other two returned to Japan. Three other long-liners began operations off southeastern Alaska late in January.

# STATES

## California

### FISHERIES ARE PART OF EDA STUDY FOR SAN DIEGO

A 3-phase, 18-month study aimed at providing new jobs in ocean-oriented industries in San Diego, Calif., was announced by the Economic Development Administration (EDA). EDA approved $115,000 in technical assistance funds for the study.

The money was requested by San Diego's Community Development Department. The City will add $10,000 to the EDA funds.

The first phase will take 6 months. It will determine the feasibility of establishing a tuna cold-storage plant and cannery, and a fish-meal processing plant. San Diego officials estimate that successful operation of such facilities could provide 400 to 1,000 new jobs in the area. It also will include a survey to see whether it is possible to set up a fishermen's cooperative for marketing and other services. This could increase annual income of fishermen.

#### Second and Third Phases

A second 6-month phase will determine the practicability of plants to process goods that now cross San Diego docks when entering or leaving the U. S. The survey will determine what items could be processed to reduce bulk, such as making plywood from logs, or compressing unrefined chemicals.

The final phase will start at the same time as the second and take about one year. It will involve compiling a list of the types of ocean-oriented firms with the best potential for creating jobs. It also will prepare a master plan for establishing firms.

* * *

### ANCHOVIES DOMINANT IN PELAGIC FISH SURVEYS

During 1967, 8 pelagic fish surveys were made in the California Current system from the Oregon border to Magdalena Bay, Mexico, reports The Resources Agency of California. Most of the effort was concentrated in southern and central California waters. The principal survey methods were echo-sounding transects and midwater trawling.

Anchovies dominated all other species in numbers and in biomass. They were distributed in quantity everywhere but north of San Francisco. The surveys indicate that southern California is a major population center with a seasonal peak abundance in spring, when the adult population concentrates for spawning.

In central California, the anchovies were very large adults. Their distribution is seasonal. The largest quantities occur in summer and fall, and there is a marked scarcity in winter and spring. The echo-sounder surveys, along with tagging, indicate that these fish migrate in and out of this area from southern California.

#### Off Central Baja California

A second anchovy population center was found off central Baja California, Mexico. The Resources Agency believes there is strong evidence that these fish are a separate population from the California fish. Although the size of this population has not been determined, it appears about the same as the California population.

In spring, the behavior of anchovies in southern California is favorable for conducting a quantitative survey with echo-sounding transects. A June 1967 survey produced an estimate of 1.8 million schools. If the size of these schools could be determined accurately, a reasonable estimate of total population size could be made.

Lanternfishes were the second most abundant fishes. They were distributed widely--but nowhere abundantly, or concentrated. Sardines were detected and sampled only in Baja California. No large quantities were found, nor was there evidence of a strong incoming year class. Pacific mackerel were very scarce in all regions surveyed.

## Florida

EDA APPROVES FUNDS TO DEVELOP JOBS IN FISHING INDUSTRY

The Economic Development Administration (EDA) has approved $150,000 in technical assistance funds to help develop methods of canning and marketing mullet, mackerel, and bonito in order to create new jobs in the southern fishing industry. A seafood firm in Miami, Fla., was the applicant.

Principal Species

The firm will conduct an 18-month project in cooperation with Florida and BCF. At present, mullet, Spanish and king mackerel, and bonito, which will be the principal species studied, are not being fully utilized. Successful processing and marketing programs for these species would create jobs in food plants and the fishing industry in Florida and other southern States.

Total cost of the project will be $232,500. Florida and BCF will invest some funds to cover services to complete the financing. The applicant's plant and other facilities will be used to conduct the project.

Aspects of Study

The funds will permit continuous fish processing to develop methods and standards for cannery operations. The project also will include preparation of recipes and demonstrations for dieticians and others responsible for preparing food in institutions. Further, the most profitable use of byproducts from the food processing will be determined.

BCF had reviewed proposal and recommended it to EDA.

* * *

GREATER USE OF CALICO SCALLOP BEDS EXPECTED

Increased commercial utilization of large, underutilized calico scallop beds off Florida's east coast is expected. During September-December 1967, 5,035 bushels of scallops were landed by 4 vessels at St. Augustine and Port Canaveral.

On Feb. 1, 1968, at least 5 more vessels fishing for processors in Georgia and North Carolina were getting ready to enter this fishery.

In 1967, the calico scallop catch off North Carolina dropped. This increased interest in developing the Florida beds, which were outlined first by BCF exploratory surveys in 1959-60.

## Texas

FPC PILOT-RESEARCH PLANT AT TEXAS A & M

A fish protein concentrate (FPC) pilot-research plant is operating at Texas A & M University. The plant is wholly funded by Sweco, Inc., Los Angeles. It is operated jointly by Sweco and the University's chemurgic research laboratory.

Objectives

The FPC pilot plant will work toward these objectives: (1) Determine plant design and equipment specifications for future large-volume commercial production of FPC. It will use a single solvent (isopropyl alcohol) extraction process; (2) produce sufficient test quantities of FPC to be incorporated into food and for market evaluation studies by interested industries; (3) investigate feasibility of using a variety of fish for commercial production of FPC; and (4) conduct intensive test program to determine most economical method to produce high-quality FPC on a mass-production basis. ("Oil, Paint & Drug Reporter," Jan. 29, 1968.)

## Oregon

FIRST STATE-U. S. FINANCING OF SALMON HATCHERY

The Oregon Fish Commission has awarded a $402,729 contract to construct the first salmon hatchery financed jointly by the State and the U. S. The Federal funds were authorized under the Anadromous Fish Act, P. L. 89-304.

The hatchery, scheduled for completion in October, will be on Elk River, Curry County,

near Port Orford. It will have potential rearing capacity of 2 million salmon a year for release in southern coastal streams.

In coho salmon, this release will produce an estimated 15,000 spawners, and a catch of 45,000 fish.

## Oregon-Washington

### FALL CHINOOK FROM U. S. HATCHERIES PLANTED IN WILLAMETTE

Interior Department's Fish and Wildlife Service planted 8,000,000 baby salmon in tributaries of the Willamette River early in February. It was part of a continuing effort by U. S. and State agencies to establish a run of Fall Chinook there before the Willamette Falls fishway at Oregon City is completed.

This spring, about 1,500,000 Fall Chinook now being raised at Eagle Creek National Fish Hatchery also will be released into the Clackamas River, a Willamette tributary.

Donald Johnson, BCF Regional Director, reported that 1,000,000 of the fry and fingerlings were transported by trucks from Little White Salmon National Fish Hatchery, and 7,000,000 from Spring Creek National Fish Hatchery, both in Washington State. BCF pays for both hatcheries, which are operated by the Bureau of Sport Fisheries and Wildlife.

#### Oregon and Washington Cooperate

The Washington Department of Game and the Oregon Game Commission provided tank trucks to help move the large amount of baby fish. About 400,000 small fish were transported in each truckload. Research personnel of the Fish Commission of Oregon helped select appropriate release sites.

The baby salmon were released at various points in the Molalla, South Santiam, Little North Fork Santiam, North Santiam, and Clackamas Rivers.

The fish stay in these tributaries for a short period, then begin swimming down the Willamette, into the Columbia, and finally into the Pacific Ocean. Survivors will return in 3 or 4 years as mature fish. They will spawn in the streams where they were planted.

The fishery agencies that conducted the planting program hope that eventually an annual run of 100,000 Fall Chinook will be established to pass the Oregon City Falls via the improved Willamette Falls fishway.

#### Fishermen May Benefit

Johnson said: "We are complementing the planting of Fall Chinook by the Fish Commission of Oregon with this release of the fish from the national hatcheries. On the basis of returns through the partially completed fishway of earlier releases of Fall Chinook salmon, this program of stocking hatchery fry and fingerlings appears to be paying off."

He said establishment of a self-sustaining run of Fall Chinook in the Willamette River would add greatly to the commercial and sport fishery. Fishery agencies hope that pollution problems in the lower Willamette will be resolved by the time the fish come back from the ocean.

## Virginia

### VIMS SCIENTISTS TAG STRIPED BASS

Fishery scientists of the Virginia Institute of Marine Science (VIMS) at Gloucester Point, Va., are tagging striped bass (rockfish), an important sport and commercial fish along the mid-Atlantic seaboard. During the first half of February, 1,500 stripers 6 to 30 inches long were tagged and released in the York River. In the third week, the scientists shifted to the Rappahannock River to begin tagging there as soon as the river is ice free.

"The tagging will be spaced over the biological year of the fish," said Dr. Edwin B. Joseph, Assistant Director of VIMS. The present effort is to locate and tag fish before they reach the spawning grounds in spring. The next major tagging program is scheduled for just after the spawning season, when many adult fish are returning from fresh water just above the brackish part of the rivers. The third tagging effort will take place in the fall.

"The success of these tagging programs will depend largely on the cooperation of both

sport and commercial fishermen returning tags recovered from the fish they catch," Dr. Joseph emphasized.

The tags being attached to striped bass are yellow, plastic discs, about $\frac{1}{2}$-inch diameter. On one side, there is an identifying number; on the other, "Return tag to VIMS, Gloucester Point, Virginia 23062, REWARD." One dollar is paid for each tag returned.

What Tags Can Tell

Returned tags help scientists answer such questions as: "Where within a river system do specific populations of fish move?," "Does one population of fish intermingle with another?," "Do specific fishing methods select fish of given size and age?," "What proportion of the total catch is taken by sport-fishermen and by each type of commercial fishing gear used?," "How many fish of each age group die each year during the pre-migratory phase of their life?," "What is the relative proportion of fish of each year-class (fish of the same age) in the total catch?"

The answers help marine scientists develop management plans to ensure the best use of this valuable resource.

The work is supported in part from Federal and state funds. It is a cooperative study of VIMS scientists and the U. S. Bureau of Sport Fisheries and Wildlife.

## New York

### $7\frac{1}{2}$-FOOT STURGEON FOUND IN HUDSON

Optimists interpret the finding of a $7\frac{1}{2}$-foot sturgeon in the Hudson River as a sign that the valuable fish has come home after a half-century Odyssey. No one is sure why it left, but overfishing and pollution are mentioned most often.

The Hudson River Valley Commission reported the killing of the $7\frac{1}{2}$-foot female Atlantic sturgeon by a Verplanck, N. Y., fisherman who used his boat's propellers to do it. The sturgeon contained over 50 pounds of roe.

Other Sturgeon Reported

The November 1967 issue of "Sea Secrets," published by The International Oceanographic Foundation of Miami, Fla., stated: "Large sturgeon have been reported at other places on the Hudson over the past few years, and some have even been hooked, although these escaped because the anglers did not have the

extremely heavy gear necessary to land such fish. There has been no commercial sturgeon fishery on the river since the turn of the century, when the stocks vanished in the face of overfishing and pollution. Before that, 'Albany beef,' as the sturgeon were called, was a major resource of the Hudson Valley. Sturgeon are the source of what is probably the most valuable of fishery products--caviar. In one peak year the sale of Hudson caviar reached $6 million. If the sturgeon return in force to the Hudson, a resurgent fishery will go a long way towards defraying the cost of cleaning the river."

The Giant Fish

The salt-water sturgeon is a toothless, bottom-feeding fish found in the world's non-tropical seas. In the spring, it arrives in rivers to spawn; it may remain all summer. Species similar to the sturgeon have become landlocked in fresh water.

In the Soviet Union, there is a large demand for the roe, or eggs, of sturgeon as caviar.

## Maine

CANNED SARDINE STOCKS
LOWER AS 1968 BEGAN

Canners' stocks of Maine sardines on Jan. 1, 1968, were down 16,000 cases from a year earlier and sharply lower than in the two previous years. This was reported by the Census Bureau.

| Type | Unit | 1/1/68 | 1/1/67 | 1/1/66 | 1/1/65 |
|---|---|---|---|---|---|
| Distributors | Actual Cases | 222,000 | 232,000 | 267,000 | 238,000 |
| Canners | Std. Cases1/ | 339,000 | 355,000 | 520,000 | 538,000 |

1/100 3¾-oz. cans equal one standard case.

Light 1967 Pack

The 1967 pack totaled 1,181,000 standard cases, compared with 1,2770,000 standard cases packed in 1966, according to the Maine Sardine Council. The light 1967 pack was due mostly to extended periods of bad weather and generally poor spring fishing. In 1967, as in 1966, 23 canning plants operated during the year. One plant has since been dismantled.

The Council has reported that the 1968 pack to February 10 was 83,000 standard cases. This compares with 68,000 cases for the 1967 period. Fishing by purse seiners was reported good and weather favorable. Fifteen canning plants were operating.

## Alaska

THE FISHERIES IN 1967

The 1967 commercial catch of fish and shellfish totaled about 370 million pounds live weight, reports BCF Juneau. The value to fishermen was about $47 million. This is the lowest catch since 1960's 359 million pounds worth $41 million.

The 1967 catch was 36 percent less in volume and 42 percent less in value than the 1966 landings of 582 million pounds valued at $81 million.

The marked decline in 1967 landings was due to greatly reduced catches of salmon, king crab, and herring--together down 237 million pounds from 1966. For the first time in history, the volume of salmon landings--131 million pounds--was overshadowed by another species--135 million pounds of king crab.

Estimates of 1967 Year-End Catch and Value

| Species | 1967 1/ | | 1966 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | 1,000 Lbs. | US$ 1,000 | 1,000 Lbs. | US$ 1,000 |
| Halibut | 33,000 | 5,000 | 33,354 | 7,774 |
| Herring | 9,500 | 140 | 19,256 | 289 |
| Sablefish | 348 | 42 | 2,311 | 273 |
| Salmon: | | | | |
| King | 10,300 | 3,200 | 9,350 | 2,949 |
| Red | 52,300 | 11,000 | 92,767 | 19,737 |
| Coho | 12,400 | 3,800 | 16,113 | 3,705 |
| Pink | 26,700 | 3,500 | 162,866 | 22,093 |
| Chum | 29,300 | 3,300 | 52,230 | 5,718 |
| Total | 131,000 | 24,800 | 333,326 | 54,202 |
| Misc. Fish | 266 | 45 | 150 | 26 |
| Herring Eggs on kelp | 378 | 285 | 662 | 496 |
| Crabs: | | | | |
| King | 135,000 | 13,500 | 159,202 | 15,670 |
| Dungeness | 11,500 | 1,380 | 5,053 | 606 |
| Tanner | 80 | 8 | - | - |
| Shrimp | 46,300 | 1,852 | 28,193 | 1,288 |
| Clams | 120 | 12 | 29 | 9 |
| Grand Total | 367,492 | 47,064 | 581,536 | 80,633 |

1/Preliminary data supplied by Alaska Department of Fish and Game.

Several Bright Spots

Despite the reduction in overall landings, there were several bright spots. Dungeness crab landings totaled 11.4 million pounds, up 130 percent from 1966. Shrimp landings were a record 46.3 million pounds, up 60 percent. Tanner crab landings, though only 80,000 pounds, also were a record. Salmon roe production is estimated at 6 million pounds with a raw product value of $1 a pound. This is over 50 percent of the value of the U. S. Pacific halibut fishery.

Commercial Scallops

Scallops were landed for the first time commercially in December 1967. "The resource is estimated to be large, the product is rated excellent, and the price is the highest in history."

The port of Kodiak had landings of 111 million pounds worth $10 million. It dropped from third to fourth place among U. S. ports in value of fishery landings. It was behind San Pedro, Calif., $29.5 million; Brownsville, Texas, $16.5 million; and New Bedford, Mass., $15.7 million; it was ahead of Boston, $9.4 million.

# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## Chemical Control of Oyster Predators Pays Off

Chemical methods are showing convincingly their commercial value in controlling oyster predators in New Haven Harbor, Conn. About 250,000 bushels of oysters from the 1966 spatfall, planted on about 200 acres of bottom, are being treated with lime for starfish control. Also, granular Polystream is being used to control oyster drill.

Losses of oysters to starfish and drill during May-November 1967 were 4-5 percent. This compares with over 50 percent loss for untreated grounds with similar oyster plantings. There was a total loss of the 1958 commercial oyster set to predators before the end of its first year.

Milford Lab Methods Used

The 1967 achievement was the first large-scale commercial demonstration of the effective control methods developed at BCF's Milford (Conn.) Laboratory. It shows the importance of these methods to a successful mariculture system for oysters.

Such routine treatment of oyster grounds can be expected to increase production from the usual 1 to 1 per bushel of seed planted to an 8-10 to 1 per bushel planted over the $3\frac{1}{2}$-year period required to reach harvest size.

Long Island Fishery May Benefit

This is a considerable economic return over planting without chemical controls. Combined with hatchery production of seed and 1966 commercial set, it may contribute to a resurgence of Long Island's oyster fishery.

## Collapsible Lobster Pot Is Suited for Continental Slope Fishing

Personnel of BCF's Gloucester (Mass.) Exploratory Fishing Base have built a prototype collapsible lobster pot of a size suitable for fishing on the Continental Slope.

When opened, the pot is 3 x 4 x $1\frac{1}{2}$ feet. It collapses to 3 feet x 4 feet x $3\frac{5}{8}$ inches. Five folded pots can be stored in the exact space taken by one opened pot. This will be important when transporting many pots a considerable distance from port to fishing grounds.

3 'Heads' In Pot

The pot has a valuable feature: 3 "heads." Only the ties at the end of the "skate" head leading into the "parlor" section need to be modified to make trap collapse quickly and easily. This can be done by using elastic or spring-loaded ties--or through quick-detaching method for clipping ties to pot frame, as used on prototype pot.

## These Lobsters Prefer Artificial Reef as Home

An artificial reef built over a year ago near the mouth of Boothbay Harbor, Maine, has 6 times more lobsters on it than are present in the adjacent natural habitat--and 12 times more than colonized it during its first year.

In November 1966, personnel of BCF's Boothbay Harbor Laboratory completed the artificial reef to provide a habitat for lobsters under study. The reef covers about 10,000 square feet of bed rock, cobble, and mud-covered ocean bottom in 50 to 80 feet of water.

Monthly throughout 1967, the lab's SCUBA team observed and counted the reef's inhabitants. A few lobsters moved onto the reef during the first 2 weeks and, since then, the population has increased steadily.

A year after construction, in November 1967, observations showed the apparent density of lobsters about half that in adjacent natural habitat--and 3 times that existing on the reef's site before it was built.

Population Booms

Since its November report, the SCUBA team has reported "a dramatic increase in the relative apparent density of lobsters"--6 times more than are found in adjacent natural habitat and 12 times more abundant than during reef's first year.

The reef lobsters have been joined by scallops, sea urchins, anemones, starfish, cunners, sculpins, rock eels, cod and redfish. Colonial hydroids are abundant on the exposed rock surfaces. The siltation level is where it was 2 months after reef was built.

The reef is open to commercial lobster fishing. About 10 to 15 traps have been set on or adjacent to it.

## Aid to Florida's Thread Herring Fishery

On Feb. 5, a Florida State court lifted the ban on the developing thread herring fishery off the State's west coast. The fishery had started well in 1967, but the State closed it when it decided to enforce a law prohibiting the incidental catching of food fish.

The large, unused thread herring resource is a valuable alternative for the menhaden industry.

The staff of BCF's Biological Laboratory at St. Petersburg Beach presented data at the court hearings that food fish were less than one percent of the catches. BCF's thread-herring biological research program, which developed the data, already is considered a good investment. BCF's new research vessel, "Oregon II," has been helping the fishing fleet find and catch the fish.

## Aid to A.I.D.

Two BCF experts served as members of a survey team sent to Africa by the U. S. Agency for International Development (AID) to explore the problems of producing, distributing, and marketing fish protein concentrate (FPC).

The two were John Dassow, Food Technologist of the Seattle Technological Laboratory, and Ben Jones, Director of the Juneau (Alaska) Exploratory Fishing and Gear Research Base. They accompanied Roy Christey, Program Coordinator of AID's Food From The Sea Service. The team visited Morocco, Uganda, Ghana, and bases on Lake Victoria.

The BCF specialists reported their findings to the State Department on Feb. 16.

## "Oregon" Surveys Midwater Schoolfish

BCF's exploratory fishing vessel Oregon returned to St. Simons Island, Georgia, on Jan. 21 after completing the first in a series of 6 bimonthly midwater schoolfish survey cruises.

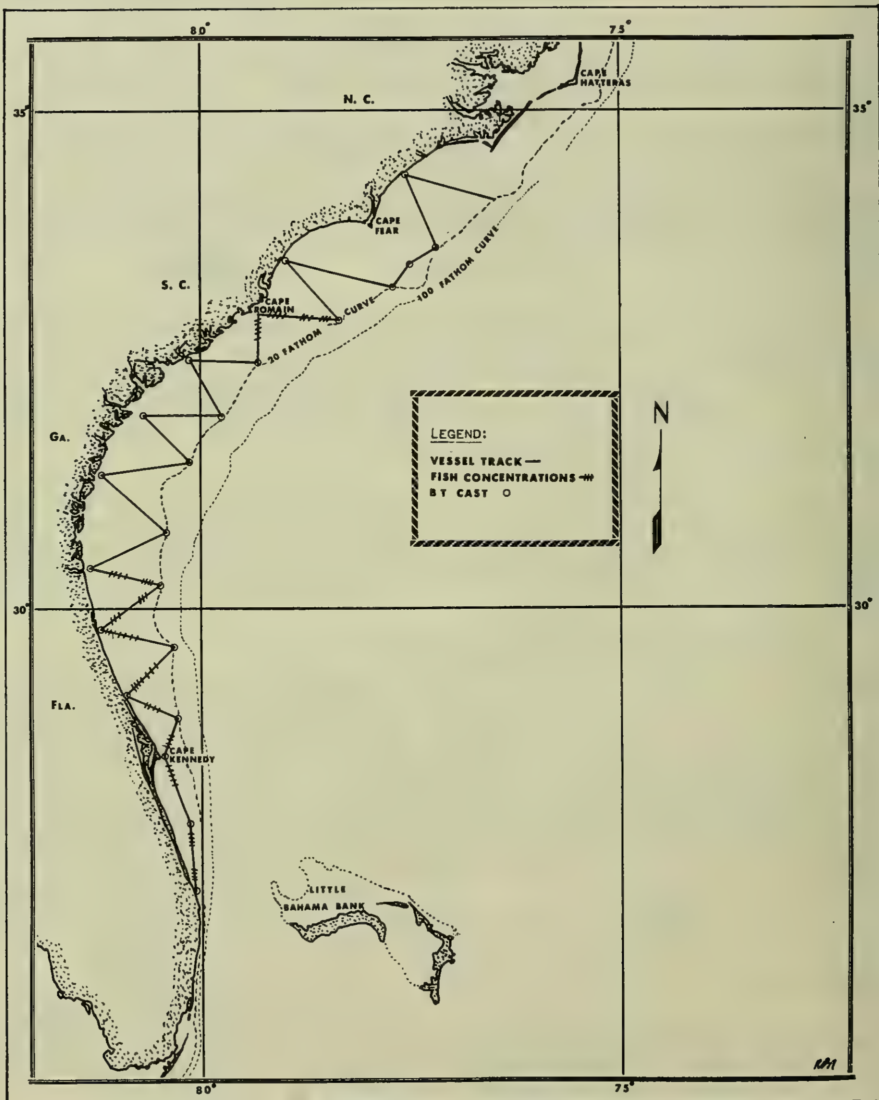
The purpose of the cruises is to determine in time and space where heavy mid-water schooling phenomena occur in coastal waters (5-20 fms.) between Cape Hatteras, North Carolina, and southern Florida by analyzing high-resolution vertical echo tracings obtained on standard transects (see chart).

Detailed Knowledge Unavailable

Detailed knowledge concerning the relative abundance of commercial concentrations and daily and seasonal movements of midwater species in the study area is currently unavailable. Frequent observations made incidental to other operations, and a few trial catches, have indicated that the area may support heavy stocks of midwater dwellers, including round herring, thread herring, anchovies, and possibly sardines.

Results of the 6 cruises will be used to establish guidelines for exploratory and experimental fishery operations, if warranted.

Echo tracings obtained on this cruise show the area south of Jacksonville, Florida, to contain heavy concentrations of midwater schools. North of Jacksonville, no indications of concentrations were obtained, with the exception of some limited schooling in a small area near Cape Romain, South Carolina.




R/V Oregon Cruise 125, Jan. 8-21, 1968.

## Purse Seining Off Africa's West Coast

From Oct. 2, 1967, to Dec. 6, 1967, I was a BCF observer aboard the M/V "Caribbean," which purse seined for tuna off the west coast of Africa. The 167-foot vessel has a net about 575 fathoms long and 48 fathoms deep, a seine skiff 34 feet by 19 feet, 2 speed boats, and a helicopter. It has a capacity of about 800 tons of tuna in 14 brine tanks. The helicopter played a great part in the trip's success. It located most of the tuna schools and helped in the setting of the net by radio communication with the vessel.

The helicopter not only helped the Caribbean but also 2 other U. S. seiners: "Southern Seas" and "Day Island." We were in constant communication with these vessels and spotted tuna for them as much as possible.

First Set off Cape Palmas

The vessel left San Juan, Puerto Rico, Oct. 2. Final preparations for fishing were made while crossing to Africa and were completed by Oct. 14. The first set was made on a school of skipjack tuna (Katsuwonus pelamis) showing at the surface near Cape Palmas during the morning of Oct. 15; it was unsuccessful. A strong current caused the cork line to sink and made it possible for the tuna to go over the net. A second set made later in the day caught 30 tons of skipjack tuna and some frigate mackerels and bullet mackerels (Auxis thazard and A. rochei), which were


Approximate cruise track and set positions.

thrown overboard. No tuna signs were seen the next 2 days so we proceeded to Annobon Island.

On Oct. 18, the Caribbean's captain talked to the captain of a French combination purse seine-bait boat. The latter reported that the French fleet was fishing off Angola and making fairly good catches of yellowfin tuna (Thunnus albacares).

We arrived off Annobon Island on Oct. 20. A few tuna schools were seen around the island, but they would not stay up so that a set could be made. Because the bottom was rough, the captain did not want to chance losing the net so early in the cruise. We then headed for the coast of Angola in search of the French fleet.

Off Pointe Noire

The third and fourth sets were made Oct. 21 and 22 off Pointe Noire. The third set caught a half ton of skipjack tuna, but most escaped under the net; 40 tons of yellowfin tuna were caught in the fourth. Little tuna (Euthynnus alletteratus) and Auxis were also captured but thrown overboard. The French, along with some Spanish seiners, were seen Oct. 23 near 9°00' S., 12°00' E. We remained in this area until Nov. 10, except for 2 short exploratory trips south. The water in this fishing area was of low transparency, making it difficult to estimate the tonnage of the schools before a set was made. The species of tuna in the school could be determined visually. Thirty-five sets were made in this area, catching 249 tons of skipjack tuna and 325 tons of yellowfin tuna (this includes some bigeye tuna, Thunnus obesus). A Japanese purse-seine 5-vessel group was seen in this primary fishing area from about Nov. 8 to Nov. 10, when we left for Pointe Noire.

Exploratory Trips

The first exploratory trip was made Oct. 24 south to 10°38' S. Poor tuna signs were seen. The second trip was made Nov. 8 south to 12°01' S. Fair skipjack tuna signs were seen during the morning. From the helicopter, the captain sighted some small Portuguese bait boats off Benguela, Angola, catching skipjack tuna. No tuna signs were seen in the afternoon.

After leaving this area, no tuna signs were seen again until Nov. 17 off Cape Palmas.

Ten sets were made from Nov. 17 to Nov. 21 (8 were on porpoise--common dolphin, Delphinus delphis schools--) and caught 89 tons of yellowfin tuna. The water off Cape Palmas was generally blue and clear. The yellowfin tuna swam beneath the porpoise schools (this could be seen from the helicopter) and made it difficult to determine the tonnage before the sets were made. The 2 speed boats and helicopter were used to herd the porpoise and thus the tuna into the net. Some sets were made without seeing any tuna with the porpoise. The 2 sets not made on porpoise captured only little tuna and Auxis. The yellowfin were all of the larger size (950 mm. fork length and above). No skipjack tuna or bigeye tuna were captured in this area.

We left Nov. 22 and headed for Dakar. On Nov. 23 we observed one purse seiner and 3 bait boats catching one-pole yellowfin tuna at 8°40' N., 14°36' W. The tuna would not stay up for us, so we continued on toward Dakar. We arrived Nov. 25. No fishing was done after this date.

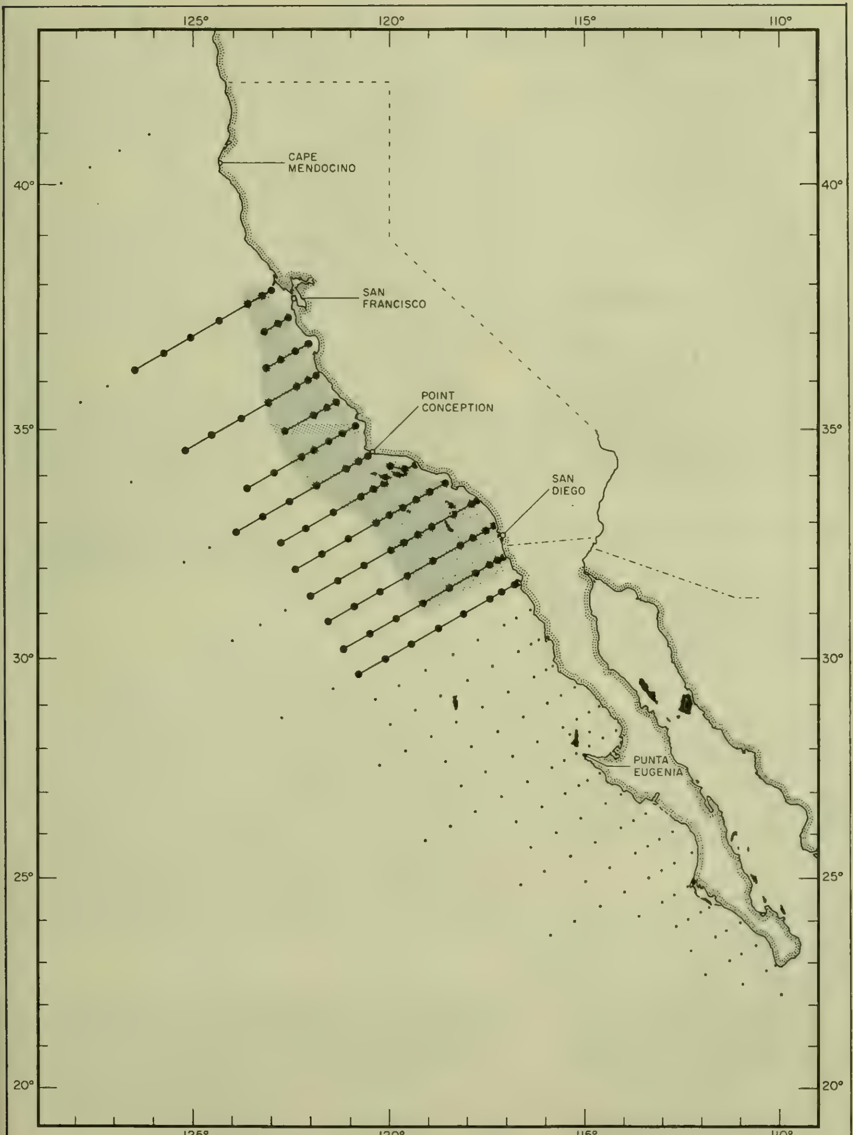
The Caribbean's captain considered all skipjack tuna under about 400 mm. fork length unmarketable, and had them thrown overboard.

--By David C. Simmons,
BCF Tropical Atlantic Biological
Laboratory, Miami, Florida

## Survey Hake Larvae in Northern Part of California Current

The size and range of Pacific hake spawning stock have been best described by the California Current fish larvae surveys conducted at the BCF Fishery-Oceanography Center in La Jolla, Calif., since 1951. In the last few years, we have furnished information on these surveys to the BCF Exploratory Fishing and Gear Research Base and Biological Laboratory, Seattle, Wash.

In January 1968, Robert C. Counts, fishery biologist on loan from EASTROPAC, conducted the biological survey program of CalCOFI on the Scripps Institution of Oceanography vessel "Horizon." At the end of each transect of the California Current, he radioed the occurrences of hake eggs or larvae. In the accompanying figure, the cruise




Cruise track of the Horizon, Cruise 6801, and the approximate zone of occurrence for hake spawning.

track of the vessel and the approximate zone of occurrence for hake spawning are indicated. Based on previous records, it was expected that the distribution area and intensity of spawning would increase through February.

--By Paul E. Smith,
Fishery Biologist (Research)
BCF Fishery-Oceanography Center,
La Jolla, Calif.

## 'Delaware' Finds Northern Shrimp in W. Gulf of Maine

During a seasonal shrimp survey cruise, the M/V Delaware found extensive populations of northern shrimp (Pandalus borealis) concentrated in the western Gulf of Maine--between the northern edge of Jeffreys Ledge and Cape Cod Bay. (Cruise 68-1: Jan. 6-19, Jan. 29-Feb. 7, 1968.)

The Delaware resurveyed selected areas explored during its Cruise 67-9 in Nov.-Dec. 1967.

Trawl tows were made in 30 to 109 fathoms; catches were zero to 1,900 pounds of shrimp per tow. Count per pound (heads on) for all shrimp taken was 30 to 60, well within range for commercial use.

Cruise objectives: (1) to determine if any changes had occurred in size composition of shrimp populations since fall survey, (2) to ascertain extent of change, if any, in magnitude and location, (3) to test and modify a new mechanical shrimp-fish separator, and (4) to investigate new methods of handling freshly caught shrimp.

Procedure: 70 tows were made: 67 with a roller-rigged 70-foot Maine shrimp net, and 3 with a chain-rigged 70-foot Maine shrimp net. The bottom was too rough for successful fishing with chain-rigged net. All tows were 60 minutes, except those shortened by "hang-ups" or soundings of very rough bottom. Preliminary exploratory tows with small try net were not made--unlike fall cruise.

Fishing started on western tip of Middle Bank, continued northward along western edge of Wilkinson Basin, and southward across Jeffreys and Scantum Basins. After completion of each tow, data on catch size, pound count, and shrimp length were taken.

Results: Of the 70 tows, 63 caught shrimp and 7 did not; 22 tows produced catches of 500 pounds or more. Catches varied from zero to 600 pounds with chain-rigged net, and 3 to 1,900 pounds with roller-rigged net. Generally, the best catches were made in 50 to 60 fathoms and 80 to 100 fathoms, depending on area. Other tows made outside areas of shrimp concentrations found during Cruise 67-9 produced some small catches, but they did not approach levels of better-producing areas. Tows made during daylight generally produced better catches than nighttime tows, although one of best catches (1,600 pounds) was taken at 4 a.m.

Catches near Middle Bank were large--much better than during fall survey. Up to 1,300 pounds were taken per 1-hour tow. Shrimp concentrations were denser and catch composition was improved. Fewer trash fish were present; shrimp size was larger than during the fall. The heaviest concentrations were found in the same locations in the fall. Outside these locations, the number increased somewhat--but not enough to support commercial fishing.

From Wildcat Knoll northward to about 25 miles south of Casco Bay, shrimp populations also followed distribution noted during fall, but the density had increased. The largest catch was 1,900 pounds; several over 1,000 pounds were made. Many tows in 80 to 100 fathoms along western edge of Wilkinson Basin produced catches of 500 pounds or more per 1-hour tow. In shallower and deeper waters, catches were very small. While this area generally supports a very good population of commercially excellent shrimp, its boundaries follow a narrow zone along 100-fathom line on western edge of Wilkinson Basin. However, catches are relatively clean of trash fish, and shrimp size is good.

In Jeffreys Basin-Scantum area, shrimp population density and structure were about the same as in Cruise 67-9; shrimp concentrations remained in same general location. The maximum catch was 700 pounds.

Size of Shrimp: A small random sample was taken from each catch and weighed to determine weight/count relationship. A few catches produced shrimp of 30 to 35 per pound. Most of catches, however, were 35 to

50 per-pound size shrimp. Length measurements were taken from selected samples at most stations; carapace lengths were 15 to 33 millimeters.

Note: For more information, contact Keith A. Smith, Base Director, or Phillip S. Parker, Fishery Biologist, EF&GR base, State Fish Pier, Gloucester, Mass., 01930, Telephone: 617-283-6554.

## BCF Promotes Fish in Milan

The Bureau's Office of International Trade Promotion (OITP) took part in the Milan (Italy) catering show, Jan. 20-27, and stimulated interest in U. S. frozen fishery products. Several Italian firms said they would like to import and distribute individually quick frozen (IQF) oysters, IQF shrimp, breaded shrimp, breaded scallops, Dungeness crab meat, west coast cooked shrimp meat, and lobsters.

OITP reports that the considerable interest reflects an improving Italian economy. Latest figures for sales of frozen foods in Italy showed a 50 percent increase in the first 9 months of 1967 over the 1966 period. Half the increase was in fishery products.

## Flying Fresh Fish to Market

To help the Pacific Northwest groundfish industry, BCF personnel worked with container manufacturers and airlines to develop an inexpensive, leakproof shipping container. They developed a satisfactory one in cooperation with the airlines. Then they conducted test marketing programs to evaluate the acceptability of the containers--and to develop inland markets for fresh west coast fishery products.

Air Ship 3 Million Lbs.

BCF's initiative stimulated several firms to ship fresh fishery products by air from the Pacific Northwest to midwestern, southern, and eastern retail outlets. During 1967, 3 million pounds were shipped, compared with practically none in 1966.

## What We Know About Tuna's Behavior at Sea

Man has hunted several species of the swift and valuable tunas for thousands of years, but he has accumulated remarkably little reliable knowledge of the behavior of his prey at sea. Only within recent decades has there been a concerted effort to describe precisely how tunas behave in the wild. So reported biologist Eugene L. Nakamura of the BCF Biological Laboratory, Honolulu, to an FAO conference of fishery experts in Bergen, Norway, in October 1967. Nakamura is chief of the laboratory's behavior and physiology program. He was summarizing the literature on field observations of the tunas.

Nakamura found that the conditions of fishing have set sharp limits on man's knowledge of tunas. The most widely used methods of catching them require that they be hungry. So many of the observations about them concern feeding behavior.

Schools of Thought About Their Feeding

Sometimes, the tunas appear to seek out a single species of small fish as prey; at other times, they do not. Near Hawaii, for example, tunas sometimes appear to prefer fishes that live deep in the ocean, rather than surface-living fishes or baitfishes thrown into the water.

A hungry fish may bite poorly or well. One scientist has found that between the extremes of starvation and satiation, the less food the fish have in the stomachs, the less likely they are to bite well. But other scientists have found that fish with empty stomachs bite very well.

Skipjack tuna, the most plentifully caught tuna in the Pacific Ocean, display vertical bars on their sides during feeding. Some scientists say the catch will be good when the fish exhibit these bars.

Tuna School Sizes Vary Widely

Tunas travel in schools, which can vary enormously in size--from a half dozen to many thousands. In 1958, near San Benito Island, off the west coast of Baja California, purse seiners took 4,000 tons of bluefin tuna in a single school. This is about three-fourths the catch of the entire Hawaiian skip-

jack tuna fleet in a whole year. In 1966, a BCF research vessel near the Bahama Islands came across a school of bluefin tuna that required $2\frac{1}{2}$ hours to sail across.

Almost all species of tunas have been reported in mixed schools of two or more species, Nakamura says. But, according to researcher Heeny S. H. Yuen of the Honolulu Laboratory, these "mixed" schools probably are distinct schools of different species drawn together by a common stimulus, such as food.

In the eastern Pacific Ocean, the largest U. S. tuna fishery, skipjack tuna and yellowfin tuna often are caught together in purse seines. Scientists have found that the excitable skipjack, when captured, calmed down when placed in presence of less erratic yellowfin.

### Schools of Same-Size Tuna

Schools of tuna usually consist of fish of the same size. Even if two or more species are present, the fish are about the same size. Probably, this is because they can maintain only a certain swimming speed.

A Japanese scientist has observed that schools of skipjack tuna that bite well maintain an orderly formation, like marching troops; those that bite poorly are "disorderly."

Some tunas school at night. Schooling is thought to be a function of sight. Nakamura thinks the fish can see well enough at night to school either from moonlight or light shed by luminescent organisms. Fishermen use the luminescence of planktonic organisms disturbed by fish.

### Water Temperature A Factor

In the eastern Pacific, purse seining for tuna has been most successful when a shallow, upper, mixed layer of the sea has been underlain by a "thermocline" with a sharp temperature gradient. That is, the temperature drops off sharply within a few dozen feet. This sharp gradient is widely believed to deter tuna from sounding (diving) and escaping the nets. However, it may not be temperature alone that causes fish to avoid the thermocline. The water there often is turbid and, sometimes, there is perilously little oxygen in the layer.

### Seek Floating Objects

Like many other fishes, tunas appear to seek out floating objects. Some scientists think they use them as "landmarks" in a largely featureless sea. Recently, other scientists have said that the chief purpose of the floating objects appears to be shelter. In any event, tunas often are found near logs, driftwood, floating vessels, even dead whales. Japanese scientists say that schools may wander as far as 7 or 8 miles from such an object and then return. "If this pelagic homing does occur," Nakamura says, "it implies that the tunas have some sort of navigational system."

### Birds Aid Man

Birds are most helpful to man in finding tunas. In the central Pacific, and in some other areas, fishermen rely almost wholly on sighting bird flocks to locate tuna, Nakamura points out. "They even rely on the behavior of the birds to determine certain characteristics of the schools. . . . The number and spread of the birds are indications of school size. If the birds dive and circle fast and erratically, the fish are small. If the birds are seen diving into the water, the tunas have driven their prey to the surface and are feeding actively. If the birds scatter or sit on the sea surface, the fish have sounded."

The tunas are among the swiftest fish. Their measured speeds have ranged from 0.8 to 25 meters a second (2 to 56 miles per hour).

### Honolulu Lab's Program

Nakamura is interested in the behavior of tunas at sea and in the lab. His group is concentrating now on two aspects of tuna behavior: their reaction to different species of live bait, and their subsurface distribution. The largest Hawaiian fishery--for skipjack tuna--uses as bait a local-to-Hawaii anchovy called nehu. The researchers are investigating possible alternate bait species for the anchovy.

To study the location of unseen tuna, his group uses a continuous-transmission, frequency-modulated sonar aboard one of the lab's research vessels. This sonar provides data on depth, direction, and speed of tunas.

# ARTICLES

## OCEANOGRAPHY'S ROLE IN DEVELOPING MARINE RESOURCES

By James H. Johnson*

Natural resources are developed in response to a present or projected need. Future economic and social needs for natural resources are strongly conditioned by the expected increase in world population. An examination of past statistics and projected trends in world population is sobering. In 1600, world population was about 350 million; by 1800, the figure had doubled; by 1900, it had doubled again and stood at about 1.5 billion. And again since then, the world's population has doubled itself. Within the next 35 years, if this rate of increase continues, there will be over 6 billion persons on earth. Though it has taken all the vast reaches of time to arrive at today's population of around 3 billion, it may take no more than 35 years to add the next 3 billion.

Clearly, if the world population continues to rise as projected, the demand for natural resources will intensify. It is not clear, however, just how much of the demand will be satisfied from resources in the marine environment. This environment, however, appears likely to play a significant role in supplying food, mineral, water, and recreational resources.

In general, the development of marine resources follows a similar pattern: Location - Description and Assessment - Extraction - Processing - Marketing.

This paper outlines future demands for food and describes some kinds of oceanographic data and programs needed to develop marine food resources. Emphasis is placed on the location, description and assessment, and extraction phases, though certainly processing and marketing are of equal importance for full development of the resource. Also, economic factors must be considered in all phases of development.

### World Protein Shortage

Today, the limited quantity of food--in calories--is a great concern to many parts of the developing world, but the nutritive value--protein--is even more crucial. Supplies of protein are particularly scarce and costly in the poorer nations. The recent report of the President's Science Advisory Committee on the World Food Problem[1/] concludes:

"It is imperative for programs designed to alleviate protein deficiency to produce big results in a relatively short time. Since even the most vigorous efforts probably will fall short of the goal, work should be initiated promptly on any program which shows promise of possible significance."

Certainly none of the steps taken to date to solve this problem has been effective enough to halt the worsening trend. No adequate solution is in sight. President Johnson recently warned that the shadow of starvation and impending famine has grown even darker. He said it was necessary for the United States and other nations to make a massive effort to help the less fortunate of the earth help themselves.

The urgency of this problem can be demonstrated by the following factual highlights:

1. World population is expected to increase at a frightening rate.

2. Even today, at least 20 percent of the 2.25 billion people living in less-developed countries receive too few calories, and about 60 percent have diets inadequate in nutritional quality.

3. If present growth rates continue until 2000, there will be more than four times as

*Deputy Assistant Director for Biological Research, BCF. Article is based on paper presented at Ogden Oceanography Seminar, New York City, N. Y., Oct. 16, 1967, sponsored by Ogden Technology Laboratories, Inc.

1/Commercial Fisheries Review, August-September 1967, pp. 1-3.

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many people in the less-developed countries than in the developed ones.

4. If similar foods are consumed in the next 20 years, estimated protein and calorie needs mean that the world will need 50 percent more food in 1985.

5. The population-control effort does not offer much hope for solving the food supply problem in the near future.

6. Recent rates of growth in food production in the developing countries have been slower than those of consumption.

7. Poor distribution systems within and among countries make the situation even more disturbing.

In recent years there also has been a growing demand for fish and fish products in the United States, edible and non-edible. The per-capita use of fish and fish products increased from 42 pounds (round weight) in 1950 to 62 pounds in 1966. An estimate based on projections of population, income, and per-capita consumption is that total use of fish and fish products in the United States will increase to 28.1 billion pounds in the year 2000. This is 134 percent over the 12 billion in 1966.

### Estimates of Potential Harvests

When one examines the rapid growth of fishery activity since World War II, and the expected increase in this activity to supply world demand, he wonders what the upper limits of fishery resources are that can be taken year after year. Over the past twenty years, production of living aquatic products has increased from about 20 million metric tons to about 50 million metric tons (Figure 1).

Estimates have been made in recent years on the possible sustained production from the oceans. These estimates are essentially of two types. One extrapolates present trends and success in areas now heavily exploited to like regions of the oceans yet unexploited. The other is based on food-chain dynamics--on the amount of phytoplankton produced naturally in the ocean, and the flow of energy through the food web to fish. Both have shortcomings. The former approach appears, on the average, to give estimates much below those of the latter.

At the Second Annual Marine Technology Society Meeting in Washington, D. C., June 1966, W. M. Chapman of Van Camp Seafoods, estimated that the ocean produces about two billion tons of marine animals each year that are large enough and useful enough to form the basis of a practical commercial effort.

Schaefer (1965) has estimated the harvestable crop from the net rate of photosynthesis of organic matter and its transfer through the food chain. He concludes that a minimum of 200 million metric tons of fishery products can be taken on a sustained basis--and that the figure appears reasonable and probably conservative. This agrees closely with the estimate in a 1962 publication of the National Academy of Sciences--National Research Council of 190 million metric tons that could be taken annually--or about four times that now taken.

On the conservative side, estimates made by some scientists at the International Conference on Fish in Nutrition, 1961, Washington, D. C., suggest that we may be approaching the upper limit of sustained production faster than we realize.

There is much need for further study on the processes governing ocean productivity to refine the estimates now being made. At present, however, the consensus seems to be that production from the sea can be increased significantly.

The greatest increases in catch are expected to come largely from the lower trophic levels. This expectation is already borne out by production figures of the last two decades (Figure 2) which show the greatest growth in fisheries from herringlike fishes. Peru's catch record provides an outstanding example of how the harvest of lower trophic level forms can catapult a nation into prominence in world fish production (Figure 3).

### Oceanography's Role Increasingly Important

The role of oceanography in development of food resources will become increasingly important. Results of oceanographic surveys will provide understanding of ocean processes needed for more efficient means of locating new resources. Follow-up programs will be directed at stock assessment, including the determination of effects of environmental change on abundance and distribution of stocks, an understanding of which will lead to fishery forecasts. Concurrently, ocean engineering programs will be pursued for developing efficient harvesting techniques.

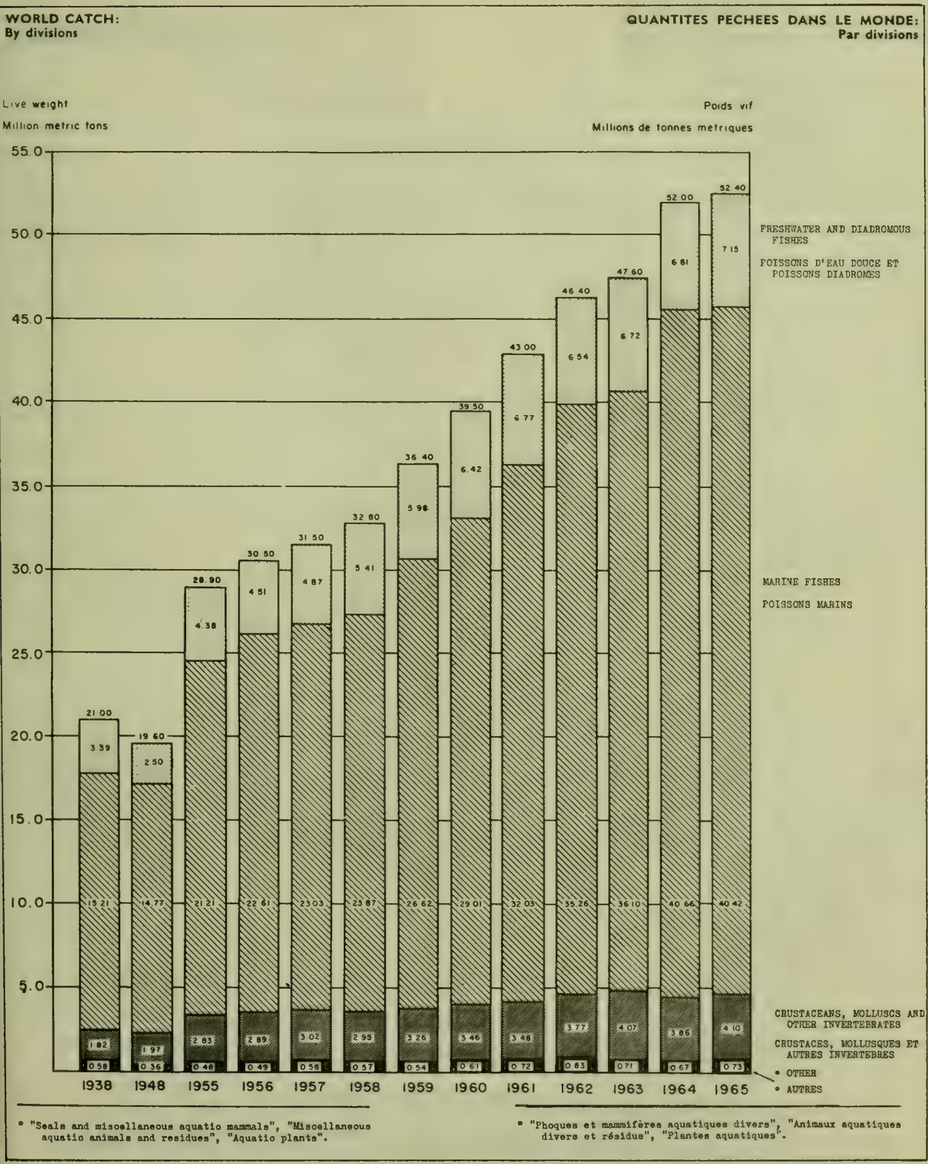


Fig. 1 - World catch of aquatic products (FAO).

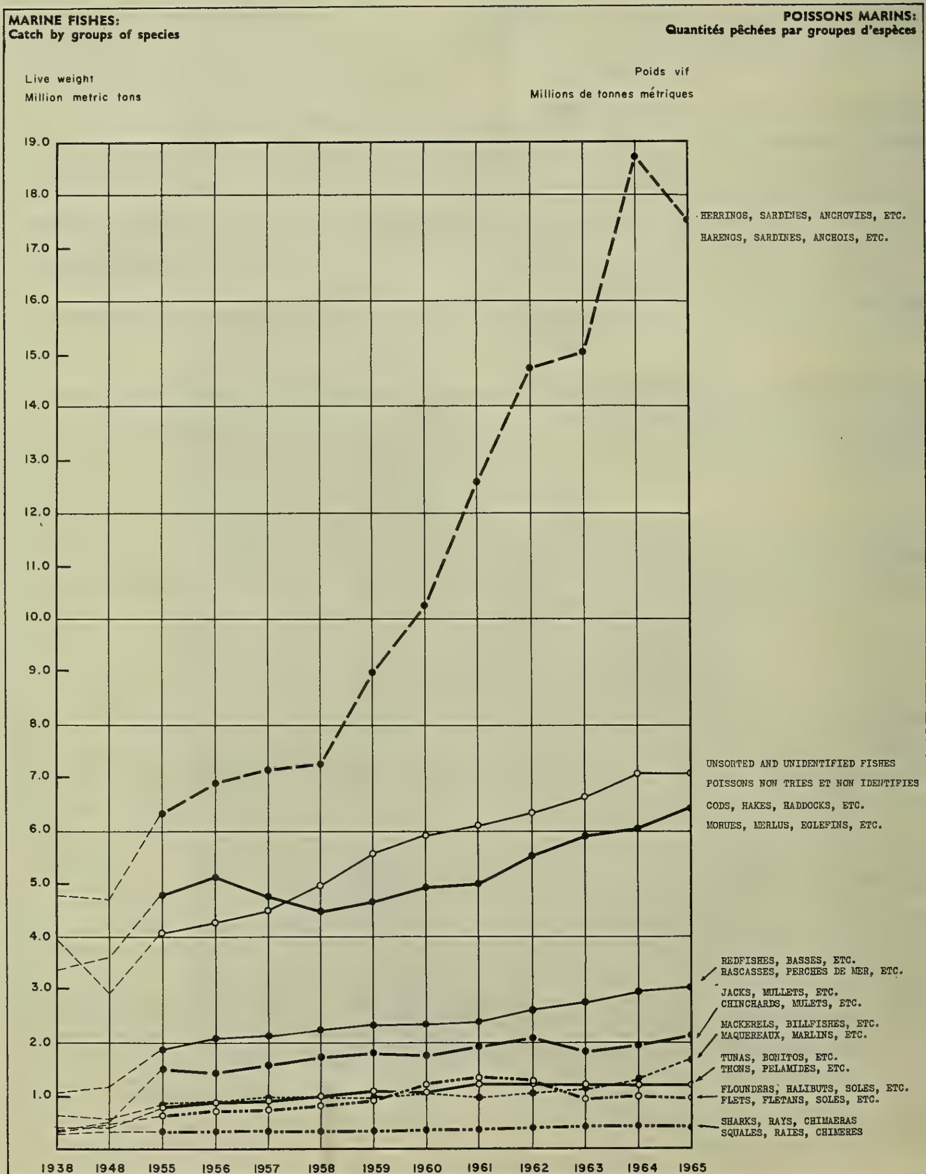


Fig. 2 - World catch by major species groups (FAO).

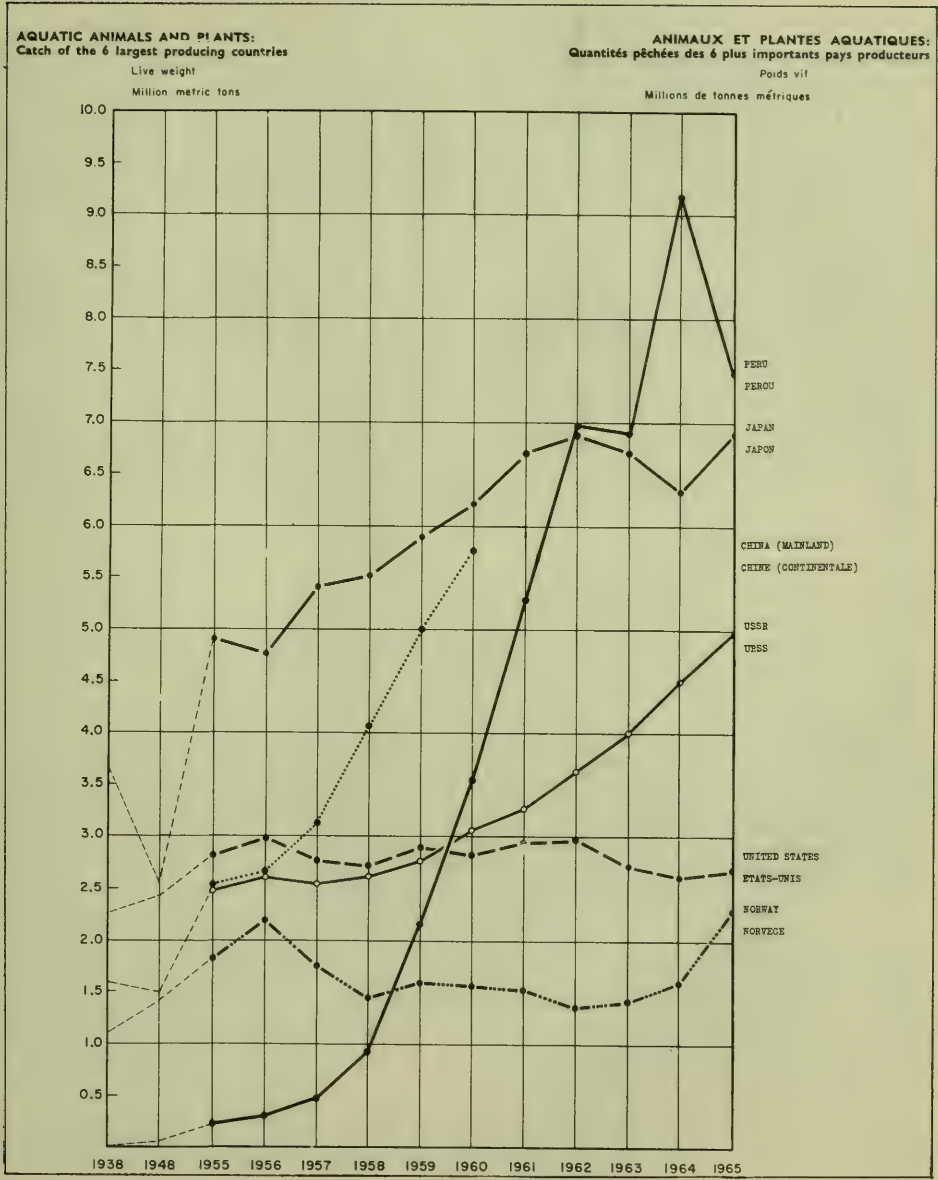


Fig. 3 - Catch of aquatic animals and plants by nation (FAO).

Oceanography will play a role in locating new resources by providing information on areas of high basic productivity which, in turn, suggest possible large fishery resources. For example, in the report, "Atlas of the Arabian Sea for Fishery Oceanography," Institute of Marine Resources, University of California, the authors have examined International Indian Ocean Expedition data and conclude that the potential for fishery resources in the western Arabian Sea is very high. The southwest monsoons cause upwelling in the summer, which can be noted from the surface temperature field (Figure 4). This upwelled water, bringing nutrients to the surface, triggers high productivity of phytoplankton during June through August along the western side of the sea, and results in increased zooplankton volumes. These observations, along with reports by merchant vessels from time to time of massive fish mortalities, suggest that the western Arabian Sea may be one of the world's most productive areas.

Oceanography Important to Prediction

After stocks have been located, some manner of assessment follows. This involves determination of substocks, maximum sustainable yield of stocks, and understanding the interaction of stocks with the environment. Achievement of the latter leads to information needed for prediction of abundance and distribution of the fish stocks. It is here that oceanography may play its most important role.

According to Sette (1966) in a paper presented at the Second Annual Marine Technology Conference, one problem of the U. S. fishing industry is that, unlike most other U. S. industries, it does not easily lend itself to the American genius for applying technology and systems research and management.

He suggests that a large obstruction to applying a modern-system type of operation at the fishing level is the variation in abundance,

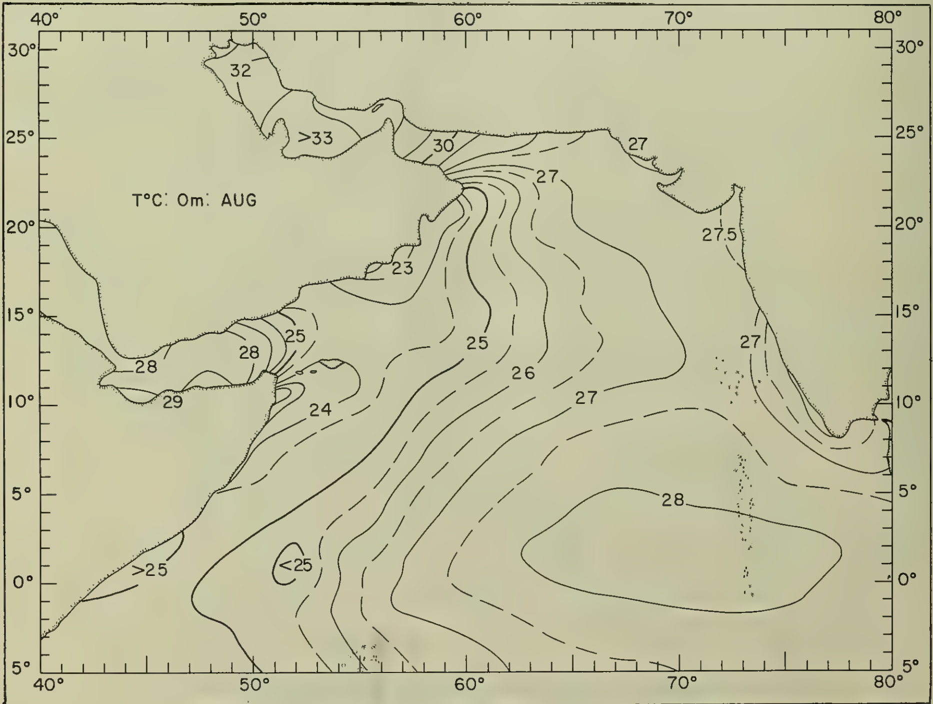


Fig. 4 - Sea-surface temperature °C. August in the Arabian Sea.

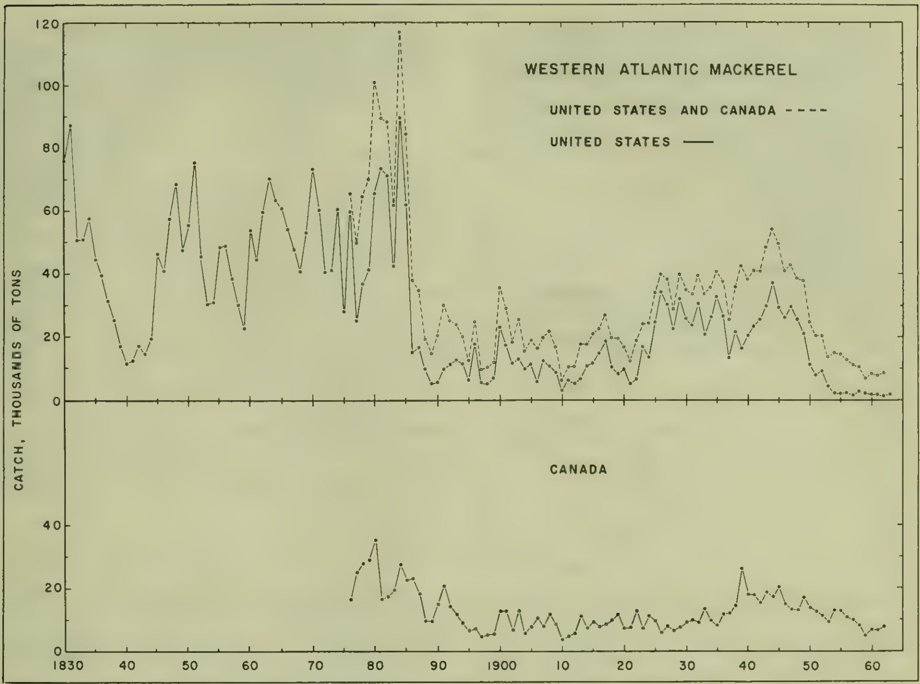


Fig. 5 - Catch of mackerel along the Atlantic coast of the United States.

location, and catchability of the fish. Too much time is spent hunting for fish; too little in catching them. On occasions, when a fleet comes upon good fishing, its landings glut the market and there is either a price reaction or, sometimes, a failure of the market to handle the fish. Often, the net effect on the fisherman is an income too little to keep his vessel and gear in repair; or, the income may be too little to keep him in the fishery. The effect on the processor or the wholesaler is a highly irregular supply of domestically caught fish. Since frozen fish have become a common international commodity, he can offset these irregularities by imports. No doubt this, as well as price advantage, has been a powerful factor in making this country a large net importer of fishery products.

Sette's thesis is that changes in the ocean environment cause major changes in fish distribution and abundance and thereby produce irregularities in fish catch. He points out substantial differences in the amplitude of fluctuations in the catch of various fishes. In general, the catch of bottom fishes like cod, haddock, and others fluctuates less than the catch of most other types. In contrast, the pelagic near-surface schooling fishes, such as tunas, mackerels, and herrings, fluctuate most widely in abundance and especially in distribution.

## Factor of Infant Mortality

Variation in the overall abundance of a species may be caused by year-to-year variation in infant mortality. Regardless of the amount of spawning, it seems that in some years many young survive through larval and juvenile stages and grow to commercial size; in other years, very few survive. The record of the western Atlantic mackerel catch (Figure 5) shows variations which may be caused predominantly by such variations in infant survival.

During the 19th century, the mackerel was a major food item and a mainstay of the New England fishery. A barrel of salt mackerel stood along with the cracker barrel in almost every grocery and general store. Then, in 1885-1886, there was a catastrophic decline in catch of about 90 percent. The fishing ports suffered greatly, and salt mackerel became a minor food commodity. It remained so for 40 years. Then, in the middle 1920's, there was an upsurge. From a 10-year sample of age compositions in the catch, Sette determined that the infant mortality was nearly total in over half the years. It appeared probable, he concluded, that variations in infant mortality, probably caused by changes in environmental conditions, were responsible for most of the year-to-year fluctuations in catch.

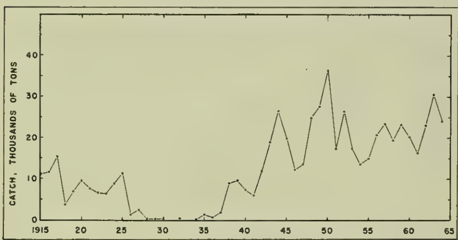


Fig. 6 - Catch of albacore tuna off the west coast of the United States.

Changes in Distribution

Another cause for fluctuation in catch is variation in distribution of fishable stocks. This changes the proportion of the fish population that comes within range of the fishery.

The variations in catch of albacore tuna along the Pacific coast of the United States most probably exemplify changes in distribution rather than in overall abundance (Figure 6). It has been proved by midocean fishing and by tagging that albacore are distributed from one side of the Pacific to the other. Our coastal fishery catches them only in summer when warm water conditions usually prevail, and they approach near enough to the coast for small boats to reach them. Scientists now believe that what seemed to be nearly total disappearance of albacore between 1926 and 1936 was merely the failure of albacore to come close enough to the coast for our fleet to reach them. It is suspected that the failure to move into coastal waters was due to changes in environmental conditions from previous years.

Fish Distribution Related to Ocean Changes

Recent findings by fishery scientists working on Pacific Ocean data have further elucidated the relations of fish distribution to environmental features. To understand these re-

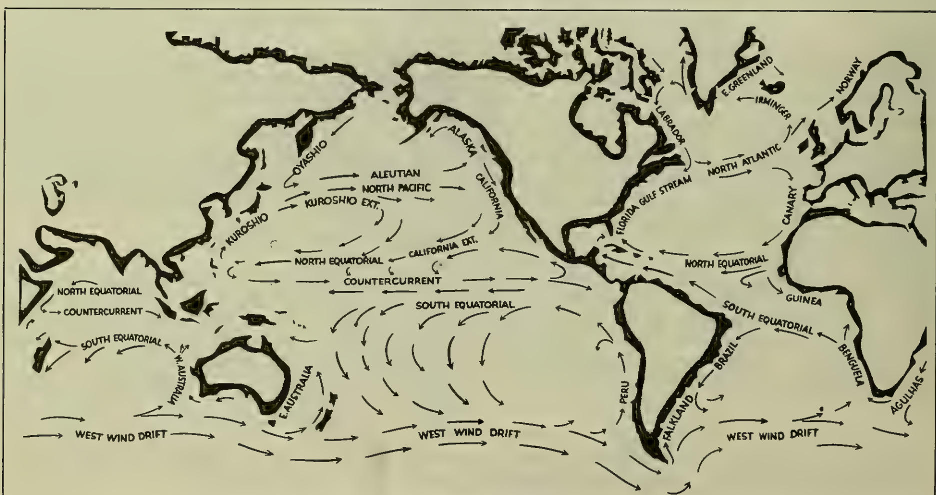


Fig. 7 - Pacific Ocean circulation.


Fig. 8 - Sea surface temperature difference (°C.) between June 1956 and June 1957.

lations, it is helpful to know something of North Pacific Ocean circulation. It is characterized by a large clockwise gyre, essentially similar to the atmospheric circulation (Figure 7). The North Pacific drift flowing easterly splits off the Oregon-Washington coast into a northward flowing current forming the Alaska gyre, and a south-eastward flowing cold California Current which turns westward off Baja California. The latter current flows past Hawaii as California Current Extension waters, becomes part of the North Equatorial Current, passes northward as the warm Kuroshio Current, and mixes with the cold southward flowing Oyashio to complete the clockwise pattern.

These currents and water masses can be identified by their temperature and salinity characteristics. For instance, the California Current, since it originates in northern latitudes, is a cold current. High rainfall and reduced evaporation in north latitudes also tend to keep its surface salinity relatively low.

The Bureau of Commercial Fisheries laboratory at Stanford University has been studying broad-scale changes in Pacific Ocean circulation, as inferred from sea temperatures, by month, from 1949-1962. In the early years of this period, the eastern Pacific Ocean temperatures were lower than average, but between 1956 and 1957 the eastern Pacific became much warmer and the western Pacific colder and remained so for several years (Figure 8).

The distribution of albacore in the North Pacific is seemingly affected by these broad-scale changes in the ocean climate. At some stage of their life history, the North Pacific albacore are sought by Japanese live-bait fishermen off Japan, Japanese longline fishermen in the west central North Pacific, and sport and commercial fishermen off the west coast of North America (Figure 9).

In May and June each year, the albacore move from central North Pacific into North American coastal waters. When spring warming occurs early in coastal waters, there is some evidence, though not conclusive, that albacore are available earlier to fishermen. If the coastal waters are warmer than usual, the fish appear farther north. The area of best

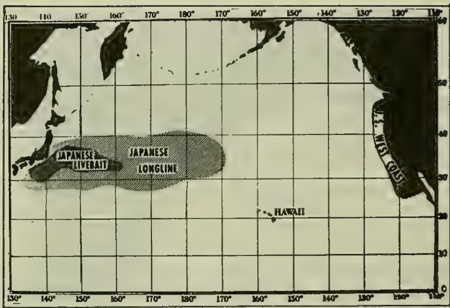


Fig. 9 - North Pacific albacore fisheries.

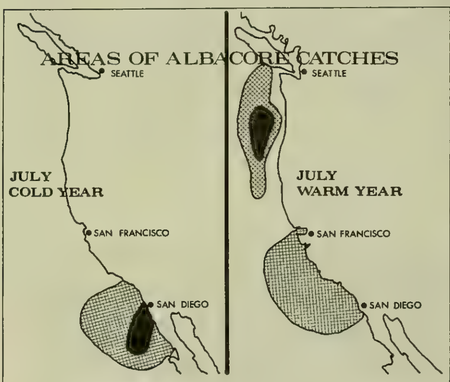


Fig. 10 - Areas of albacore catch during typical "cold ocean" years and "warm ocean" years.

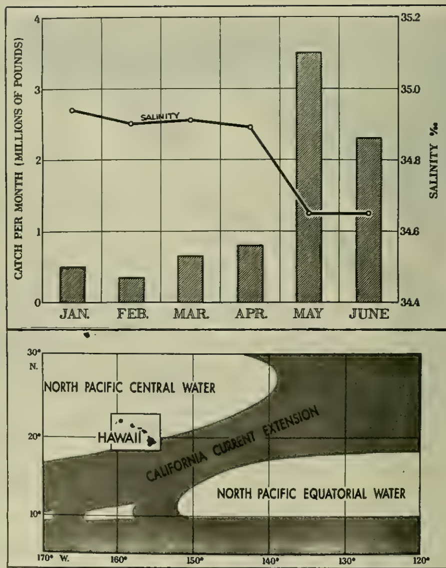


Fig. 11 - Water mass types and salinity--catch relationship of skipjack in the Central North Pacific Ocean.

catches during typical warm years is off California, Oregon, and Washington. In cold years, most of the fish remain to the south--off Baja California and California (Figure 10).

The temperature changes reflect changes in the California Current System. When large-scale changes occur, they usually persist for several months and sometimes for several years. This persistence over an extended period provides the basis for forecasting. In some years, however, preseason forecasts have been made but subsequently proved incorrect because of radical changes in ocean conditions between time of forecast and onset of fishing. The year 1967 is a case in point: The ocean temperature in the eastern Pacific changed radically from a cold temperature anomaly to a warm anomaly in a matter of a few weeks--and threw the initial forecast off. Fortunately, scientists were able to detect these changes early and adjust the forecast as the season progressed. Evidence suggests that unusual atmospheric circulation in summer 1967 caused an abnormal amount of heat flux into the surface layers of the ocean in the northeastern Pacific. This in turn caused seasonal warming of surface waters to proceed at an unusually high rate. Precision in forecasting will not improve until understanding of ocean and air-sea interaction processes causing these changes is further developed.

Downstream from the California Current, variations in the California Current Extension waters affect the Hawaiian skipjack fishery. Important to Hawaii are the North Pacific Central and North Pacific Equatorial water types and the transition zone between these, the California Current Extension (Figure 11). The boundary between the California Current Extension, with relatively low salinity, and the North Pacific Central water, with relatively high salinity, is well defined by a salinity gradient which usually lies just south of the islands during late autumn and early winter.

Normally, during February or March, the salinity gradient, and thus California Current Extension water, begins a northward movement. It passes the islands in spring and reaches its northern position just north of the islands in July or August. The movement of the boundary is monitored by analyses of salinity samples taken regularly at near Koko Head, Oahu. Scientists at BCF's Biological Laboratory in Honolulu have found that when the California Current Extension bathes the islands in summer, skipjack landings are generally high, but when North Pacific Central water prevails, landings are usually below average. From these findings, and additional information on the time that seasonal warming of surface waters occurs, predictions are being made on whether skipjack landings will be above or below average for the season.

At the western extreme of the large clockwise gyre of the North Pacific, Japanese scientists have also determined relationships between variations of the Kuroshio and success of the albacore and skipjack fisheries there.

Mentioned earlier was the eastward flow of North Pacific water diverging off the coast of Washington and Oregon. A part of this forms the counter-clockwise Alaska gyre and the Alaska stream flowing to the westward south of the Aleutians. Scientists at BCF's Biological Laboratory, Seattle, now believe that reduced flow of the Alaska stream in the spring of 1966 affected the migration routes of maturing Bristol Bay sockeye salmon, and thus affected the number of salmon available to the high-seas fishery.

Clearly, one can conclude from these few examples that variations in the ocean climate have major effects on the abundance and availability of fishery resources. An essential step toward increasing productivity of United States fisheries would be to proceed with oceanographic programs that would increase understanding of the processes causing changes in the "ocean climate." This would lead to more effective fishery predictions.

## New Harvesting Techniques Needed

Development of new harvesting techniques is urgently needed in some segments of the fishing industry. In the broadest definition, these techniques can be classified as ocean engineering developments. Two examples show how development of new harvesting techniques greatly increased fleet efficiency.

The first example is development of the power block and nylon purse seine in the Pacific tuna fishery. Following World War II, the California tuna fleet experienced several very profitable years through live-bait fishing. By the early 1950's, however, a major change occurred: imports from the Japanese tuna fishery hit heavily and, for a time, it appeared that tuna fishing by the domestic fleet might disappear entirely.

In 1956, the first seeds of technological advances that were to revolutionize the fishery occurred with development of the nylon net and power block for improved hauling of seines. Lack of capital and natural reluctance on the part of fishermen to change their method of fishing delayed rapid conversion of bait boats to purse seiners. It soon became evident, however, that large purse seiners could operate much more efficiently than bait boats. Accordingly, even though the cost of converting to purse seiners ranged from $50,000 to $150,000, and cost of the all-nylon purse seine was approximately $50,000, conversion increased gradually; in 1959 and 1960, it jumped to an unbelievable rate. Few events in the history of a major fishery have so completely revolutionized a fleet.

The second example of increasing harvesting efficiency is the development of the midwater trawl and telemetering device in the Pacific hake fishery. Hake resources are known to be abundant off Oregon and Washington, and the Soviets have been fishing them heavily. However, it was not until BCF ocean engineers developed a midwater trawl capable of fishing hake off the bottom did the United States reach the point where harvest could be attained efficiently with small vessels. The ability to position the trawl at certain depths was the clue to efficient harvesting. This was possible only through development of a depth telemetering device to accurately position the net. This is evidence that innovations do not have to be of major proportions to have a great impact on increasing harvesting effectiveness.

## Summary

In summary, then, it is clear that the role of oceanography in the development of food resources will be large. Through oceanographic investigations to determine areas of high basic productivity, new resources will be located; oceanographic studies to determine the relation of fish stocks to the environment will lead to predictions of abundance and availability;

and ocean engineers will develop new harvesting techniques that will put the U. S. fleets again in a competitive position with foreign fleets. The development of new processing techniques and products, such as fish protein concentrate (FPC), and marketing programs also will play major roles in the growth of world and domestic fisheries.

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(Robert K. Brigham)

# IMPROVING AND EXPANDING THE DISTRIBUTION OF FRESH (UNFROZEN) SEAFOODS BY MEANS OF INSULATED CONTAINERS [1/]

By Staff of the BCF Technological Laboratory, Gloucester, Massachusetts

The rigidly limited distribution of fresh (unfrozen) fish fillets has traditionally meant that inland consumers seldom have enjoyed fresh seafood products in their homes. To remedy this situation, the Bureau of Commercial Fisheries has developed an insulated, leakproof, non-returnable container suitable for extended shipments of seafood products in non-refrigerated air, rail, or truck freight. With certain accessories, this container may well make possible the transcontinental shipment of unfrozen seafoods by refrigerated ($0^{\circ}$ F.) trucks. Shipments on such refrigerated trucks to consuming areas well beyond present markets have already been made.

The discriminating U. S. consumer wants fresh (unfrozen) fish of high quality. How else explain the crowded seafood restaurants of our coastal cities and towns? Relatively few of our inland consumers, however, enjoy in their homes the delicate flavors and succulent textures of ocean-fresh, unfrozen seafoods.

There are many reasons that this demand goes unsatisfied. The major reason is the unavailability of an adequate distribution system, or of a wholly satisfactory means of utilizing the system. The fresh fish industry has never, for example, been able to fit its products into the efficient, modern, and flexible frozen-food distribution system, nor, for that matter, fully into the air-freight system. In an attempt to correct this situation, the Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Massachusetts, has devised a versatile shipping container adaptable to the air, rail, or truck systems--either non-refrigerated or refrigerated to temperatures as low as $0^{\circ}$ F.

The ideal container would be one which, while protecting the quality and appearance of fresh seafoods, would be capable of maintaining a fixed internal temperature, be entirely independent of external temperatures, be leakproof, be easily handled, be adaptable to small-order marketing and, most important, be inexpensive. It would be useful in rail, truck, and air shipments and be reasonably independent of any limitations as to time and distance in storage and transit. Since no small, inexpensive container can, as yet, maintain a fixed internal temperature nor be wholly independent of external temperatures, since many trucks have uncertain schedules, and distributors, at present, require ice on their delivered seafoods, no ideal container yet exists.

The Bureau-developed container is, in effect, a single basic container which, through use of available accessories, can be adapted to many different distribution conditions. It is insulated, leakproof, and with appropriate adjustments is suited for use in rail, truck, and air shipments. With small quantities of ice, it can be used in non-refrigerated 900-mile rail or truck shipments or on non-refrigerated, transcontinental air-freight, assuming normal transit times. Reefer-truck shipments, with van temperatures of $0^{\circ}$ F., from Boston to Chicago and to Dallas have been made with satisfactory results. Experimental shipments, using special insulation and inexpensive "heat-source" devices in $0^{\circ}$ F. vans from Gloucester to Los Angeles are in progress.

General Characteristics of the Basic Container

A corrugated, non-returnable box (specifications given in Figure 1) holds the structure together. A polyethylene bag, used as a liner, catches and holds any liquid which may drain

1/This is a general report on recent developments in shipping containers for fresh fish. Detailed reports on individual phases of the research will be published later. This is published in view of an expression of urgency by industry.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 808

| | NOMINAL SIZE | 100-LB. BOX | $ | 75-LB. BOX | $ | | $ |
|---|---|---|---|---|---|---|---|
| | CORRUGATED FIBRE-BOARD BOX, WHITE, PRINTED ON 4 SIDES | 19-1/4" x 16-1/4" x 22-1/4" 275 PSI SINGLEWALL | .62 | 18-1/2" x 16" x 17-1/2" 200 PSI SINGLEWALL | .44 | | |
| | POLYETHYLENE BAG 0.003 GAUGE | 38" x 54" | .16 | 38" x 50" | .15 | | |
| | FOAMED POLYSTYRENE @ $0.065 PER BOARD FT. | 1-1/2" x 16-1/4" x 19-1/4" (6 PIECES) | 1.27 | 1-1/4" x 16" x 18-1/2" (2 PIECES) 1-1/4" x 16" x 15" (4 PIECES) | .88 | | |
| | TOTAL MATERIAL COST (OPTIONS NOT INCL.) | | 2.05 | | 1.47 | | |
| OPTIONS | ABSORBENT FOAM (UREA FORMALDEHYDE) | $0.29 PER BOARD FT. 1 PIECE 13" x 16" x 3" | 1.25 | $0.29 PER BOARD FT. 1 PIECE 13" x 16" x 3" | 1.25 | FOR TRANSCONTINENTAL SHIPPING, ADDITIONAL FOAM IS RECOMMENDED | 0.60 |
| | DOUBLE STRAPPING | | .10 | | .09 | | |

Note: Cost data are based on 1,000 quantity delivered to New England (tentative).

Fig. 1 - General characteristics and costs of corrugated, non-returnable shipping container.

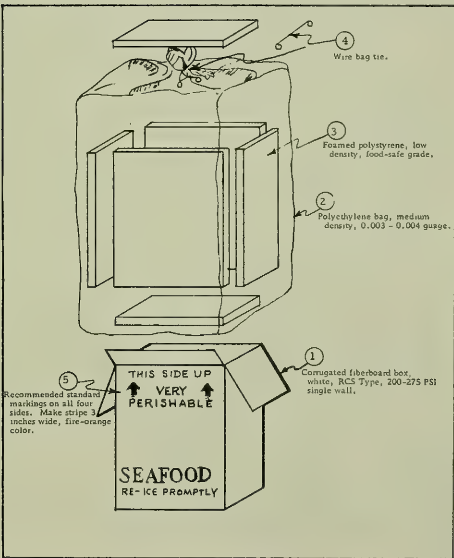



Fig. 2 - Method of assembly.

from the ice or the seafood. Slabs of foamed, food-safe plastic (density, thickness, and type to be determined by expected use) are placed on all six sides of the container to insulate the food product from its surroundings. Strapping may be used to give additional strength and dimensional stability to the package if deemed necessary. If it is anticipated that the container will be exposed to highly humid conditions, the corrugated outer shell should be wax-impregnated. The method of assembling the container is shown in Figure 2.

## Non-Refrigerated Air, Rail, or Truck Transport

For this type of shipment, the basic container is used. Low-density, food-grade polystyrene slabs ($1\frac{1}{4}$ inches in thickness) are used as insulating agents. The product being shipped is either pre-chilled and iced, or a quantity of ice sufficient to both chill and maintain a low product temperature is placed in the container. (See Figure 3 for chilling and icing guidelines.)

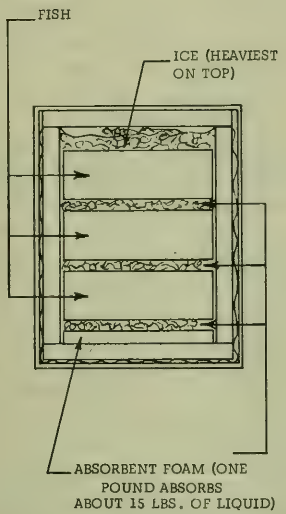
Melt-water from the ice may, if desired, be absorbed into a foamed urea-formaldehyde pad placed on the bottom of the container. One board-foot of the foamed plastic, costing about 29 cents, will absorb about five (5) pounds of melt-water. Distribution time is the limiting factor in the use of this container since the product temperature cannot be lowered below that of melting ice (32° F.). It appears to be ideally suited for transcontinental air-freight shipments and for non-refrigerated truck or rail shipments to current markets.

## Refrigerated Truck Transport

For extended transcontinental reefer-truck shipments, a variety of accessories to the basic BCF container is available. Thus the type of insulation may be varied, from the reasonably effective expanded polystyrene to the extremely effective polyurethane. Secondly, the thickness of the insulation may be increased. Thirdly, a temperature-regulating (heat-source) device may be included in the container.

The temperature-regulating accessory utilizes the fact that freezing can be a heating process. For every pound of water frozen, 144 (BTU's) of energy must be withdrawn in the form of heat. This heat is absorbed by the immediate surroundings, be they the plates of a shelf-freezer, other food products, or the surrounding air. The net effect, if the energy dissipation is limited, is a localized heating inhibition or cooling.

Pure water, under normal atmospheric conditions, freezes at 32° F. The water in fish tissue, since it contains dissolved salts such as sodium chloride, freezes at a lower temperature--between 29.8° and 30.3° F. Therefore, in an insulated container, a quantity of water will freeze completely before the water content of accompanying fish flesh begins to freeze; and, the heat slowly withdrawn from the water during freezing will serve to regulate the internal temperature of the container at 32° F. for a considerable period of time.




ICING GUIDELINES (BASED ON 1-1/4 INCHES OF FOAMED POLYSTYRENE INSULATION)

There must be sufficient ice to cool the fish to 32° F. and keep it at that temperature until it reaches its destination. To cool the fish to 32. F. from:

40° F., add 5 lbs. of ice per 100 lbs. of fish
50° F., add 10 lbs. of ice per 100 lbs. of fish
60° F., add 16 lbs. of ice per 100 lbs. of fish
70° F., add 21 lbs. of ice per 100 lbs. of fish

To keep the fish cool when the ambient temperature is:

40° F., add 2 lbs. of ice per 24 hrs.
60° F., add 6 lbs. of ice per 24 hrs.
80° F., add 10 lbs. of ice per 24 hrs.
100° F., add 14 lbs. of ice per 24 hrs.

Example: How much ice is needed for a 50-lb. box of fish when the initial product temperature is 60° F., the estimated time in transit is 1-1/2 days, and the average ambient temperature in transit is estimated at 80° F.?

To cool: $\frac{16}{100}$ X 50 = 8 lbs.

To keep cool: 10 X 1-1/2 = 15 lbs.

Total ice required = 8 + 15 = 23 lbs. minimum

Fig. 3 - Icing guidelines.

One such heat-regulating accessory is a water-soaked, foamed urea-formaldehyde plastic. It acts like a sponge, absorbing a quantity of water 15 times its own weight. The placement of six thin (one-inch) slabs of water-soaked formed plastic next to the polystyrene insulation ensures maximum absorption within the container of the heat energy released by the water upon freezing. (See Figure 4 for comparison of product temperatures in two insulated containers, one of which is equipped with such a temperature-regulating device.) Note that while the seafoods in the control (no-foam) container went into the zero-degree (0° F.) room at a higher temperature than that in the foam-containing container, there was a "cross-over" in product temperature after 36 hours of simulated transit storage. In addition, the temperature of the control container continued to drop until the product therein began to freeze at 29° F. In contrast, the temperatures of the seafoods in the experimental (foam) container held constant at 31° F. for an additional period of 56 hours, at which time the test was terminated.

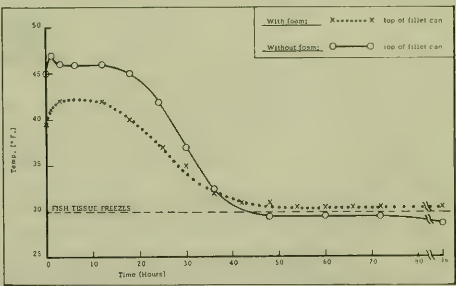



Fig. 4 - Cooling curves of fish packed in insulated containers, with and without water-absorbent foam, and stored at an ambient temperature of 0° F.

Such "crust-freezing" of the seafood, as occurred in the control container, could be damaging to the fish tissue even if maintained for only a relatively short time, and even if the temperature of the product, upon arrival, is brought rapidly up to 32° F. The appearance and the moisture-holding capacities of the

fillets are adversely affected. Moreover, maintenance by the receiver of special facilities for elevating the temperature of the "crust-frozen" product prior to final distribution and retail sale would be necessary.

## Counting the Costs

A summary of the costs of this type of packaging is given in Figure 1. Without the options, the per-pound cost is seen to be 2.05 cents for the 100-pound size, and 1.96 cents for the 75-pound size. This is about double the per-pound cost of the commonly used nailed wood boxes. The new container, however, is acceptable on any carrier whether ice is used or not, and as more carriers refuse to accept leaky packages, this factor becomes of increasing importance. Also important is the fact that if ice is used in the new container, the marketing area for fresh fish can be extended to an 1,800-mile radius; and our preliminary tests indicate that although using the absorbent foam will increase the package costs to about $3\frac{1}{2}$ cents per pound, marketing areas over 3,000 miles distant can be reached via ordinary refrigerated trucks at a cost of approximately one-sixth that of air freight.

While the urea-formaldehyde absorbent foam is relatively expensive, it can be reused many times. It is, therefore, possible to reduce its cost per-pound of fish fillet by arranging for its return to the shipper. An inexpensive, closed, tinned container shaped like a cake tin and filled with water may be used in place of the plastic. It is only necessary that the container, regardless of composition, be such as to facilitate the preferential freezing of water rather than fish tissue. Work to reduce further the costs of the basic container and of its accessories is continuing.

## SUMMARY

All work reported on herein was done with haddock fillets and the basic container utilizing low-density expanded polystyrene insulation. For the extended reefer-truck shipments, the container was supplemented with 11 ounces of urea-formaldehyde foam containing 13 pounds of water. The experimental data indicate that, under adverse conditions of exposure of individual containers to cooled ($0^{\circ}$ F.) moving (to 200 ft. per minute) air, fresh unfrozen fish fillets may be shipped to markets in an 1,800-mile radius of Boston, assuming normal transit times. When the container is supplemented with a heat-source, the unfrozen product may be safely shipped to markets within a minimal radius of 2,650 miles from Boston. Experimental shipments by reefer van from Boston to Los Angeles are continuing. Preliminary data indicate that such seafood reaching Los Angeles after 5 days in transit will still enjoy a high quality shelf-life of up to 8 days.

## FISH FACTS

Iodine, one of the most important food elements, is found in a higher percentage in ocean fish than in most other foods.

Fish and shellfish contain a variety of health-giving minerals. These minerals are essential in the building of tissues, bones and teeth.

The high nutritive quality and digestability of fish proteins class seafood among the more desirable food products.

Fish within the many marketed varieties gives you a choice of a great diversity of taste treats, and remember, fish fats are those healthful polyunsaturated fats.

Fish supplies nutritionally complete protein for proper body growth and repair, and always many essential vitamins and minerals for your complete body health and vigor.

# SUBMARINE PHOTOS OF COMMERCIAL SHELLFISH OFF NORTHEASTERN UNITED STATES

By Roland L. Wigley* and K. O. Emery**

Several thousand photographs of the sea bottom off the northeastern coast of the United States were taken as part of a joint study by the Woods Hole Oceanographic Institution, the U. S. Bureau of Commercial Fisheries, and the U. S. Geological Survey. Nearly every photograph reveals the presence of animals living in or on the bottom. Of special interest are the commercially valuable mollusks--the sea scallop (Placopecten magellanicus Gmelin), surf clam (Spisula solidissima Dillwyn), and ocean quahog (Arctica islandica Linnaeus).

Occurrence records from the photographs correspond closely with the distribution patterns for each species based on other sources. Living sea scallops were clearly apparent in the bottom photographs; of surf clams and ocean quahogs (usually buried with only the siphons exposed) only the shells of dead specimens were detected. All three species are restricted to the continental shelf, and their geographic distributions overlap considerably.

The photographs may provide clues to more efficient methods of harvesting these species.

The photographs were made at more than 300 locations between Cape Hatteras, North Carolina, and the Gulf of Maine in water depths from 2 to 1,810 fathoms (fig. 1). Single photographs were taken at 289 localities (indicated by open circles in fig. 1) mostly with a camera incorporated within a large clam-shell bottom sampler as part of a program of systematic sampling of the Atlantic continental margin (Emery, Merrill, and Trumbull, 1965). Twenty-six other sites (indicated by solid dots in fig. 1) are photographic stations where as many as 3,000 closely spaced photographs were made. These sites include: (1) remote-controlled multi-photograph camera stations in 10 submarine canyons, and one place on the open continental slope; (2) a stereographic camera system mounted on the hull of the research submarine "Alvin" (Schlee, 1967) during dives in two submarine canyons, and at two sites on the open continental slope and three on the continental shelf; (3) multi-photograph camera (two types) mounted on sleds drawn along the sea floor by research ships; (4) photographs taken with a pogo-type multi-photograph camera (Posgay, 1958); and (5) mosaic mapping of part of the continental rise in search of wreckage of the USS "Thresher" (Iselin, 1964).

The annual value of the combined sea scallop, surf clam, and ocean quahog fisheries is currently more than $16 million to United States fishermen. Sea scallops are the most valuable species, accounting for 80 percent of the total value. Surf clams constitute nearly 20 percent of the total, and ocean quahogs less than 1 percent.

Ex-Vessel Value of United States Landings of Three Species of Shellfish Taken from the Continental Shelf off Northeastern United States

| Species | 1945 1/ | 1955 2/ | 1965 3/ |
|---|---|---|---|
| Sea scallop | 1,887,215 | 11,449,000 | 13,126,307 |
| Surf clam | 629,591 | 1,365,000 | 3,197,140 |
| Ocean quahog | 109,387 | 47,000 | 11,000 |

1/Anderson and Power, 1949.
2/Anderson and Power, 1957.
3/Lyles, 1965.

*Fishery Biologist, BCF Biological Laboratory, Woods Hole, Mass.
**Senior Scientist, Woods Hole Oceanographic Institution, Woods Hole, Mass.
Note: Contribution No. 2079 from the Woods Hole Oceanographic Institution.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 810

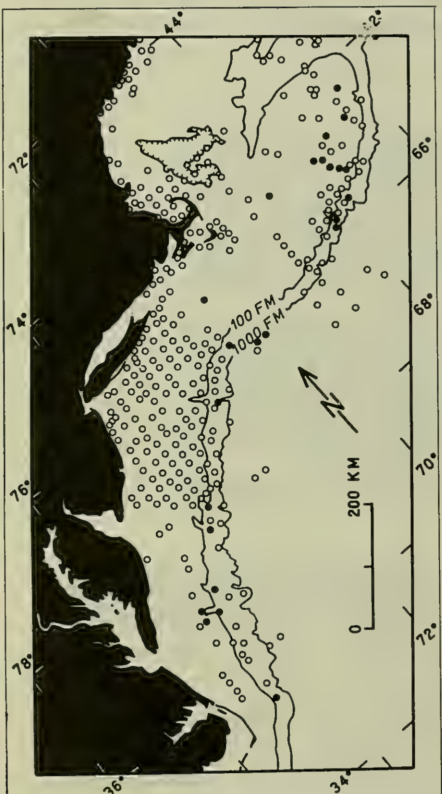



Fig. 1 - Locations off northeastern coast of United States where photographs of sea bottom were made. Open circles denote sites of single photographs; solid dots denote multi-photograph stations.

The quantity and value of sea scallop and surf clam landings have increased markedly since World War II. The value of both species has increased five-fold during a 20-year period. Ocean quahog landings, on the other hand, diminished in quantity and total value because of reduced consumer demand.

## GEOGRAPHIC DISTRIBUTION

The geographic distributions of sea scallops, surf clams, and ocean quahogs along the northeastern coast of the United States are illustrated in figures 2, 3, and 4, respectively. These charts are based on literature reports, fishery data, and experimental dredgings. All sources agree in showing that these shellfish are restricted to the continental shelf, and that their areal distributions have considerable overlap. Sea scallops have been exploited throughout most of their known distribution area, but surf clams and ocean quahogs are fished only locally.

Included on each distribution chart are station marks that indicate the locations where the specimens, either living or dead, were detected in photographs of the sea bottom. The charts reveal that, with few exceptions, the records of occurrence from sea-bottom photographs fall within distributions derived from catch records and other sources.

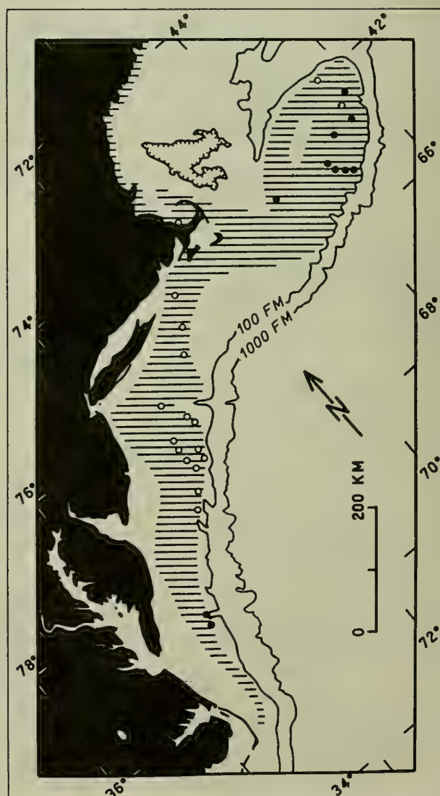



Fig. 2 - The geographic distribution of sea scallops off northeastern coast of United States. Crosshatching marks area where sea scallops have been collected. Circles and dots show locations where sea-floor photographs revealed live sea scallops or their shells.

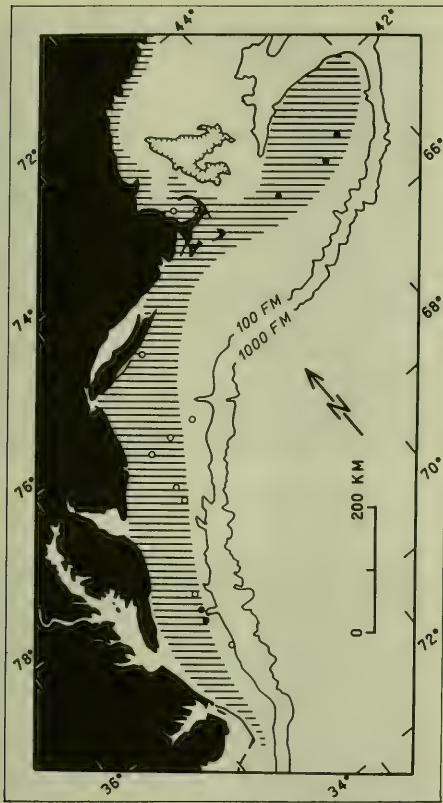



Fig. 3 - The geographic distribution of surf clams off northeastern coast of United States. Crosshatching marks area where sea clams have been collected. Circles and dots show locations where sea-floor photographs revealed surf clam shells.

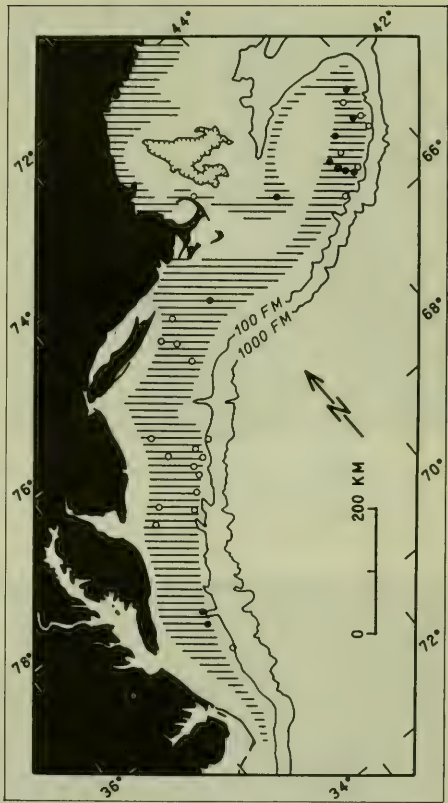



Fig. 4 - The geographic distribution of ocean quahogs off northeastern coast of United States. Crosshatching marks area where ocean quahogs have been collected. Circles and dots show locations where sea-floor photographs revealed ocean quahog shells.

## SEA SCALLOP

### Atlantic Deep-Sea Scallop
### Deep-Sea Scallop, Giant Scallop

The sea scallop, Placopecten magellanicus Gmelin, occurs along the North American coast from the Gulf of St. Lawrence to Cape Hatteras, N. C., and is taken commercially by both United States and Canadian fishermen. This fishery became important just after World War II when increased demand resulted in substantially higher prices. The principal sea scallop stocks that were fished during this rapid expansion of the fishery were on Georges Bank, but recently a substantial part of the effort has shifted to grounds between New York and northern Virginia. The bulk of the American catch is landed at New Bedford, Mass.

Sea scallops are customarily caught with heavy steel dredges 10 to 15 feet wide operated from vessels 40 to 100 feet long. Two dredges are towed simultaneously, each attached by a separate towing warp. The

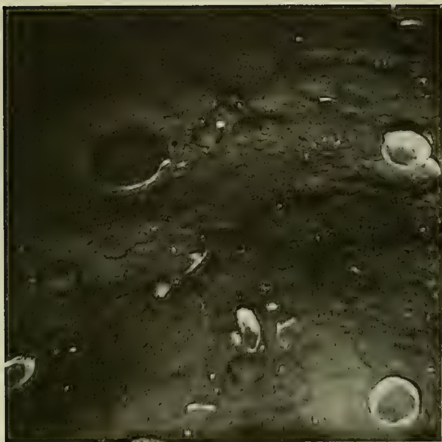


Fig. 5 - A living sea scallop and shell remains of ocean quahogs on the sea bottom. The round flat objects are live sand-dollars, Echinarachnius parma. This photograph was taken from R/V "Albatross IV" on southeastern Georges Bank (Lat. 41°13.5' N., Long. 66°38.5' W.) at station 45; water depth 45 fathoms; bottom sediment light-brown coarse sand.

Fig. 6 - Live sea scallops and shells on the sea bottom on western Georges Bank (Lat. 41°09.1' N., Long. 68°43.2' W.); photo taken by research submarine "Alvin" during dive 215; water depth 33 fathoms; bottom sediment brown pebbles.

dredges are hauled every $\frac{1}{2}$ to 1 hour, depending upon local abundance, and the contents are dumped on deck. The scallops are shucked at sea and the viscera and shells are discarded. Only the adductor muscle is retained; the muscles are bagged in 36-pound lots, iced, and brought to port.

Market-size scallops are generally $3\frac{1}{2}$ to 6 inches in diameter (shell height). Specimens of this size live on the sea bottom, unattached, and free to move about when disturbed. They are clearly exposed to view and are thus readily detected in photographs of the sea bottom. The photographs show that in relatively soft sandy bottoms they inhabit pockets or depressions (fig. 5). Where the sediment is compact, or composed of coarse materials, the pockets are small and shallow (fig. 6).

For additional information concerning this species and the fishery, refer to Posgay, 1953; Bourne, 1964; and Merrill and Posgay, 1964.

## SURF CLAM

Atlantic Surf Clam, Sea Clam,
Bar Clam, Hen Clam

The commercially important surf clam that inhabits the northeastern coast of the United States is Spisula solidissima Dillwyn, a large (up to $7\frac{1}{2}$ or 8 inches long) heavy-shelled bivalve most commonly found in sandy sediments. A demand for this species developed during World War II as a substitute for soft clams (Mya) and this has since developed into a major fishery. It started in the New York area, but it is centered now in the New Jersey-Maryland region; most of the catch is landed at Cape May and Point Pleasant, N. J.

The chief means of taking surf clams is with a hydraulic dredge. These dredges are 3 to 4 feet wide with a water jet system across the front, 8 to 12 feet long, and a cod end made of steel rings. Bottom materials and clams in the path of the dredge are loosened by jets of water pumped from the fishing vessel as the dredge is towed slowly along the bottom. Whole clams are bagged in bushel-size lots and brought to canneries ashore for processing.

Surf clams burrow into the sediment and position themselves with their posterior end upward so that the siphons are in contact with the overlying water. Thus only the siphons tips are exposed and visible. No living surf clam shells were evident in the sea-bottom

Fig. 7 - Surf clam shell (top) and eroded sea scallop shell on the sea bottom off New Jersey (Lat. 39°31.2' N., Long. 73°15.8' W.); photo taken by R/V "Gosnold" at station 1375; water depth 21 fathoms; bottom sediment medium and coarse brown sand.

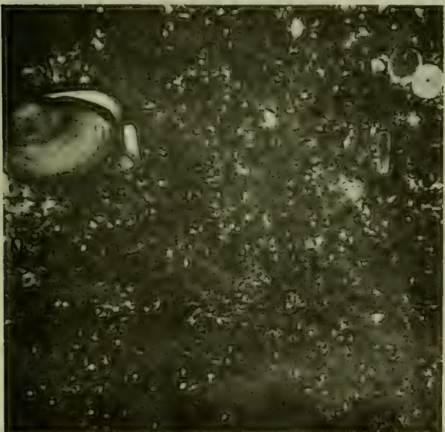


Fig. 8 - Surf clam shell on sea bottom with other shell fragments and sand-dollar tests; taken by R/V "Gosnold" off New Jersey (Lat. 38°52.4' N., Long. 73°45' W.) at station 1353; water depth 24 fathoms; bottom sediment brown medium sand.

photographs; only the shells of dead specimens were detected (figs. 7 and 8).

We could not definitely distinguish in all photographs the shells of S. solidissima from a rather rare species that has a similar appearance: Spisula polynyma Stimpson. The photographic occurrence records on the chart, therefore, may include a few shells of the latter species.

For more information about the surf clam and its fishery, see: Turner, 1953; Merrill and Webster, 1964; Parker, 1966; Growlage and Barker, 1967; Parker, 1967; and Standley and Parker, 1967.

## OCEAN QUAHOG

### Mahogany Quahog, Mahogany Clam, Black Clam

The ocean quahog, Arctica islandica Linnaeus, occurs in North American waters from Newfoundland to Cape Hatteras, N. C. It is found at water depths between about 5 and 80 fathoms, and is most common in sandy mud substrates. Its shape is similar to the common quahog or hard-shell clam, Mercenaria (Venus) mercenaria Linnaeus, but the exterior surface of its shell is covered with a rather thick black periostracum.

The fishery for ocean quahogs began during 1953 in Rhode Island, and interest in this species has remained localized there and in

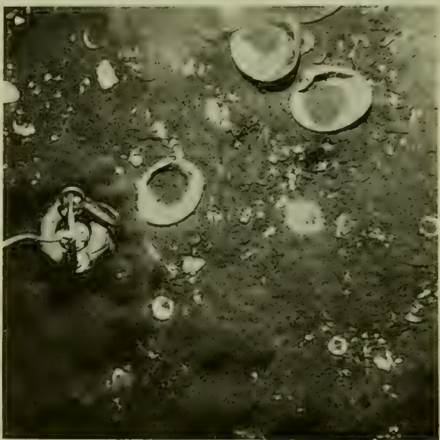


Fig. 9 - Ocean shells on the sea bottom off New Jersey (Lat. 39° 10.2' N., Long. 73°00.3' W.); taken by R/V "Gosnold" at station 1337; water depth 38 fathoms; bottom sediment brown muddy sand. Object at left is the camera tripping-weight, which has stirred up the sediment upon impact with the bottom.

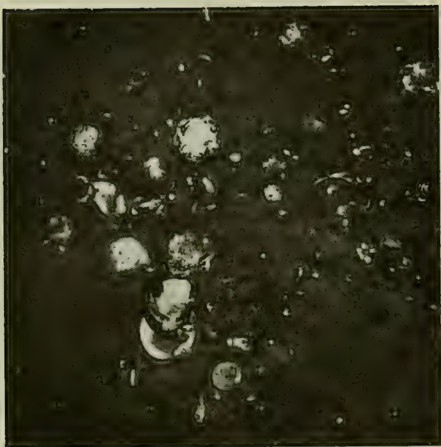


Fig. 10 - Ocean quahog shells on the sea bottom on eastern Georges Bank (Lat. 41°10.2' N., Long. 66°31.2' W.); taken by R/V "Gosnold" at station 1125; water depth 52 fathoms; bottom sediment brown medium sand.

adjacent areas. The fishery has declined because of a decreasing demand for this product, rather than a reduction in the fishable stocks. Dense beds of ocean quahogs occur along large portions of the continental shelf, even in areas where it never has been commercially exploited. Parker (1967) stated: "From these sections [off Maryland], commercial fishermen can expect catches of about 15 bushels per 20-minute tow. . . ." Average market size of ocean quahogs is from 2 to 4 inches in length. They are brought to port whole, in bushel lots.

Ocean quahogs lie buried in the sediment just below the water-sediment interface, with the posterior end upward, in much the same position as hard-shell clams and surf clams. They are not visible (except for the siphons) from above the sediment surface; consequently, the photographs revealed only the shells of dead specimens (figs. 9 and 10).

Ocean quahogs can be harvested with hydraulic dredges, as used in the surf clam fishery, or by means of a toothed dredge designed specifically for catching this species. Toothed dredges range from 2 to 3 feet wide and 4 to 8 feet long. Steel teeth 7 inches long are spaced at intervals of $1\frac{1}{2}$ to 2 inches along the bottom forward edge. The retaining bag is made of 2-inch-diameter steel rings. Dredges are towed slowly along the bottom, usually by vessels 30 to 40 feet long.

For additional information, refer to: Arcisz and Neville, 1945; Merrill and Webster, 1964; and Parker, 1967.

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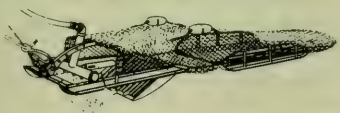
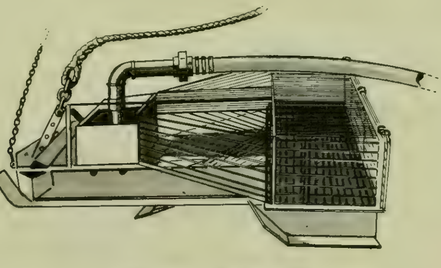
HYDRAULIC OR JET DREDGES

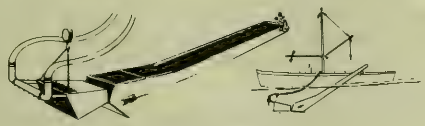
With this type of equipment, surf, soft, or hard clams are washed out of the bottom by action of jets of water from a pipe attached in front of the tooth bar. The pressured water is supplied by a high powered pump on the fishing vessel. The shellfish are then either washed on to, or collected by the tooth bar of the dredge. The Maryland type of hydraulic dredge utilizes a conveyer which brings the soft clams up to the vessel.



Hydraulic or jet dredge, surf clam



Hydraulic or jet dredge, hard clam



Hydraulic or jet dredge, soft clam

Note: Excerpt from Circular 109, Commercial Fishing Gear of the United States, for sale from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, single copy 40 cents.

# INTERNATIONAL

## Plans for EEC Fisheries Policy Delayed

The development of the Common Fisheries Policy of the European Economic Community (EEC), the Common Market, is proceeding very slowly. According to reports from Brussels, it will not be possible to put the policies into effect by July 1, 1968, as presently scheduled. One reason is the problem arising within the Six following France's veto of negotiations to accept Great Britain, Denmark, Norway, and Ireland. The European Commission probably will not bring up controversial questions at a ministerial meeting in an already-difficult situation.

Proposals Under Study

On January 25, the EEC parliament was expected to discuss a delegation report but no decisive progress was expected. The EEC Commission worked out a detailed proposal for a fisheries policy for the Six, but it must be carefully examined before it can be presented in the Ministerial Council. The Economic and Social Council presented its views in February 1968 and did not agree with the Commission on some points. A working group within the Parliament's Agricultural Committee has since worked on the question and is now ready to present its views. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 12, 1968.)

## The Fish Meal Situation

World stocks of fish meal are high: 788,000 metric tons in major exporting countries on Nov. 1, 1967. On Nov. 1, 1966, stocks were 650,000 metric tons; on Nov. 1, 1965, 233,000 metric tons.

Peruvian production and export are high. U. S. production is relatively low because of decreased landings. U. S. and world prices are lower than usual.

The major cause of low prices is the high level of world production and stocks--at a time when production of other high protein feeds also has been high.

## USDA Forecasts Increase in 1968 World Marine Oil Production

World output of marine oils in 1968 is expected to increase slightly over 1967, forecasts the U. S. Department of Agriculture. The expected increase reflects the expansion of fish oil production to a new record. Technical advances in recent years have increased the recoverable oil yield from fish. (The yield also varies with age of fish, season, and local conditions.)

Trade reports show that oil yields from Peruvian anchovy have been running at about 6 percent--higher than those of recent years. Production could be reduced if another strike occurs in Peru. But there are sizable fish oil stocks in Rotterdam and in major exporting countries. These would be enough to cover immediate demand.

Less Baleen Whale Oil

Baleen whale oil production likely will continue downward because of reduced quota of 3,200 blue whale units for 1967/68 season set by the International Whaling Commission. Quota was 3,500 units in 1966/67 season.

World Production of Marine Oils

| | Forecast 1968 | 1/1967 | 1966 | 1965 | 1964 | 1963 | 1962 | 1961 | 1960 | Avg. 1960-64 |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1,000 Short Tons) | | | | | | | | | |
| Marine Oils: | | | | | | | | | | |
| Whale | 95 | 105 | 125 | 211 | 249 | 295 | 390 | 428 | 418 | 356 |
| Sperm whale | 160 | 160 | 161 | 170 | 165 | 149 | 130 | 120 | 122 | 137 |
| Fish (incl. liver) | 1,050 | 1,020 | 1,001 | 865 | 838 | 680 | 738 | 665 | 512 | 687 |
| Total | 1,305 | 1,285 | 1,287 | 1,246 | 1,252 | 1,124 | 1,258 | 1,213 | 1,052 | 1,180 |

1/Preliminary.
Source: Foreign Agricultural Service.

Sperm whale oil production is expected to remain stable. Production estimates for 1968 are 95,000 short tons of whale oil, 160,000 tons of sperm oil, and 1,050,000 tons of fish and fish-liver oil. ("World Agricultural Production and Trade, Statistical Report," U. S. Dept. of Agriculture.)

## Commission Sets 1968 North Pacific Halibut Regulations

The International Pacific Halibut Commission (IPHC) concluded its Forty-fourth Annual Meeting in Seattle, Wash., Jan. 26, 1968.

The Commission dealt with administrative matters during executive sessions and approved a research program for 1968. The program continues the 1967 program of tagging and assessing of possible effects of foreign fishing on halibut stocks in Bering Sea and the Gulf of Alaska.

The Commission expressed concern about the effect on halibut stocks of increased trawling for other bottomfish. It also has drawn the attention of the two Governments to trawling's effect on the large population of small halibut in southeastern Bering Sea. This area has been set aside as a nursery area and all fishing for halibut in this region again has been prohibited in the proposed 1968 regulations. The Governments of the U. S. and Canada also have been advised that any additional protection afforded the large population of young halibut in the flats of southeastern Bering Sea would be beneficial.

Particular concern was expressed for the failure of stocks in Area 2 to respond to reduced removals from that area in recent years. If the stocks fail to respond adequately in 1968, more restrictive measures will be necessary.

Proposed 1968 Regulations

In view of the scientific findings and conferences with the industry, the Commission is recommending to Canada and the U. S. regulations for the 1968 fishing season that do not differ drastically from 1967 regulations. Exceptions are earlier opening dates for Areas 2, 3A, and 3B.

(1) For 1968 the regulatory areas shall be: Area 2 - All convention waters south of Cape Spencer, Alaska. Area 3A - between Cape Spencer and Shumagin Islands. Area 3B - Shumagin Islands to Atka Island, not including Bering Sea. Area 3C - west of Atka Island, not including Bering Sea. Area 4A - the Bering Sea edge - Unimak Pass to Pribilof Islands. Area 4B - Fox Islands grounds, Bering Sea. Area 4C - edge grounds and the Bering Sea side of the Aleutian Chain between 170° W. and 175° W. Area 4D - Bering Sea east of 175° W. and north of a line between Cape Newenham and St. Paul Island and waters west of 175° W. (The flats in southeastern Bering Sea east of Area 4A and south of a line between the Pribilof Islands and Cape Newenham have been declared a nursery area and are closed to all halibut fishing.)

(2) The opening and closing hours of the various regulatory areas shall be 6 p.m. Pacific Standard Time of the date indicated. Exceptions: Areas 3C, 4A, 4B, 4C, and 4D, where they shall be open at 3 p.m. and closed at 6 p.m. local time.

(3) Area 2--shall open on May 4 and shall close at the time of attainment of a catch limit of 23 million pounds, or on October 15, whichever is earlier.

(4) Area 3A--shall open on May 4 and shall close at the time of attainment of a catch limit of 32 million pounds, or on October 15, whichever is earlier. This represents a reduction in the catch limit of 1 million pounds.

(5) Area 3B--shall open first on April 14 for a period of 4 fishing days and open again on May 4 and close at the time of attainment of a catch limit of 3.5 million pounds inclusive of that poundage taken during the first season of 4 days or on November 15, whichever is earlier.

(6) Area 3C--west of Atka Island not including Bering Sea, open on March 29 and close on November 15.

(7) Area 4A--the Bering Sea edge, Unimak Pass to Pribilof Islands--shall open on April 3 and close on April 17.

(8) Area 4B--Fox Islands grounds, Bering Sea--shall open on September 1 and close September 10.

(9) Area 4C--edge grounds between Pribilof Islands and 175° W.--shall open on March 29 and close on April 22.

(10) Area 4D--east of 175° W. and north of a line between St. Paul Island and Cape Newenham and waters of Bering Sea west of 175° W.--shall open on March 29 and close on November 15.

The Commission will provide 10 days' notice of closure of Area 2; and 18 days' notice of closure of Area 3A; and at least 18 days' notice of closure of Area 3B in 1968.

The Commission decided that the next annual meeting will be held in Seattle, Wash., beginning January 21, 1969. Harold E. Crowther of Washington, D. C., was elected Chairman and Frank W. Millerd of Vancouver, B. C., Vice Chairman for the ensuing year. (IPHC, Jan. 26, 1968.)

## More Nations Sign N. Atlantic Fishing Operations Convention

Eleven more countries have signed the Convention on Conduct of Fishing Operations in the North Atlantic. Italy, West Germany, Belgium, Norway, Denmark, Sweden, Canada, Ireland, the Netherlands, Poland, and Spain signed recently.

France, Iceland, Portugal, the United Kingdom, and the USSR signed earlier.

Poland, Spain, and the USSR signed with reservations. (U. S. Embassy, London, Jan. 23, 1968.)

## Northeast Atlantic Enforcement Scheme Stalled

The Northeast Atlantic international fisheries enforcement scheme may not go into effect because Poland, Sweden, and the USSR have formally objected to the inclusion of an international enforcement article in the Convention of Fishing Operations in the North Atlantic. Therefore, this article will not come into effect as scheduled. The Netherlands has requested that the question be raised again at the next meeting of the Commission scheduled for May 1968 in Iceland. (U. S. Embassy, London, Feb. 2, 1968.)

## UN/FAO Caribbean Project "Calamar" Is Active

From September-December 1967, the "Calamar," one of 3 vessels in the UNDP/FAO Caribbean Fishery Development Project, completed 5 cruises. About half the time went into exploration and half into production fishing. She explored much of the area between 9 and 30 fathoms along the coast of northeastern South America, from Trinidad to French Guiana. About 65 tons of marketable fish were taken. The nets used were "high opening" type trawl.

The catches were 60 percent sea trout (*Cynoscion virescens*), 14 percent croakers (*Micropogon furnieri*), and 25 percent other mixed fishes. About 50,000 pounds of catfish (*Arius* sp. and *Felicthys* sp.), sharks, rays, small Sciaenids, and other small fish were caught, but they were not saved for marketing. A giant devil ray (*Manta birestris*) weighing about 2,000 pounds, 9 marine turtles, 2 conger eels (*Muraenesox* sp.), and small amounts of shrimps were taken during the period, incidental to trawlfish operations.

### Good Catches NE of Paramaribo

Good catches were made consistently in the area northeast of Paramaribo, Surinam, in 9 to 15 fathoms. About 100,000 pounds of marketable fish, or three-fourths of the total marketable catch, were taken here in 184.4 hours of fishing (66.3 percent of total fishing time during this period). The average catch rate was 9 pounds per minute of fishing (539.9 lbs./hr.). The catches included about 73 percent sea trout, 12 percent croakers, and 14 percent other mixed fish.

The area north of St. Andrews Point, Guyana, in 9 to 19 fathoms, yielded high catches. (Average 11.9 lbs./min., or 711.6 lbs./hr.). These were principally sea patwa (*Gerres rhombeus*), apparently a schooling fish; catches were not consistent. There were also good catches northeast and east of Waini Point, Guyana.

1 Net Lost, 1 Ripped Badly

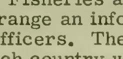
During exploratory fishing north and east of Trinidad, a net was lost at 22 fathoms (Position: Lat. $10^{\circ}54'$ N., Long. $61^{\circ}12.5'$ W.) after hanging up on a wreck. Another net was ripped badly in 14 fathoms (Lat. $10^{\circ}35'$ N., Long. $60^{\circ}56.8'$ W.). Hard bottom, many wrecks, and strong currents hampered trawling. Catches included over 50 percent "moonshine" (Selens vomer); also lane snapper, bluefish (Pomatomus saltatrix), and large flatfish (Paralicthys sp.) up to 2 pounds were conspicuous.

In cooperation with the project's marketing sector, landings of trawl-caught fish were made at Port-of-Spain, Trinidad, Point-a-Pitre, Guadeloupe, and Bridgetown, Barbados.

Oceanographic Work

To understand oceanographic conditions better, drift bottles were released, and water temperature and salinity data collected. Length frequencies of fish and other biological data were recorded. Numerous sharks were tagged and released for growth and migratory studies.

Trawling cruises in the same general area are continuing in early 1968. Emphasis is being placed on expanding coverage--and in developing information on the seasonal changes in species composition and abundance at certain key locations. (Cruise Report No. 8, UNDP/FAO Caribbean Fishery Development Project, Barbados, Jan. 15, 1968.)



## Poland and Canada May Exchange Fishery Enforcement Officers

In summer 1967, officials of the Canadian Department of Fisheries approached Polish officials to arrange an informal exchange of enforcement officers. The purpose was to familiarize each country with the way the other enforces regulations of the International Commission for Northwest Atlantic Fisheries (ICNAF). Canada, the U. S., and the USSR have done this in the past. This is the same type of exchange that the U. S. and the USSR conducted in ICNAF subareas 4 and 5 in June 1965. Although such arrangements are endorsed by ICNAF, they are not a joint bilateral enforcement scheme.

Spring Exchange Likely

In September 1967, an enforcement officer aboard a Polish trawler contacted Department of Fisheries officials at St. John's, Newfoundland, but it was not convenient at that time to make the exchange. It is expected that in Spring 1968, when weather in the Northwest Atlantic improves, Canada and Poland will cooperate in this informal exchange of fishery enforcement officers. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 19, 1968.)

## Mexico and Japan Agree on Fishing Off Mexico

On Feb. 2, in Tokyo, representatives of Mexico and Japan announced agreement on continuing Japanese fishing off Mexico. The 5-year agreement should be signed in the near future.

The main points cited were: (1) The agreement deals primarily with long-lining for tuna and related species (such as big-eyed, yellowfin, marlin, and swordfish) in the 9-12 mile zone off Mexico's Pacific coast. There the annual Japanese catch will be limited to 15,500 metric tons. (2) The Japanese will not fish near tourist resorts where sport fishing is important. (It is not known whether the Japanese have agreed to refrain from fishing beyond 12 miles in these sensitive areas.) (3) Japanese fishermen will use the same gear they now use. (4) The agreement does not change either country's position on the width of territorial waters, or jurisdiction over fishing by a coastal state. (5) On the Atlantic Coast, there will be no Japanese fishing within 12 miles. ("Excelsior," Feb. 3; Regional Fisheries Attaché, U. S. Embassy, Tokyo, Feb. 7, 1968.)

## Sign Southeast Asian Fishery Development Central Pact

A 6-nation agreement to establish the Southeast Asian Fishery Development Center

in Bangkok, Thailand, was initially signed there by Japan, Thailand, and Singapore on Dec. 28, 1967. South Vietnam, the Philippines, and Malaysia signed on Jan. 13, 1968. Several other southeast Asian nations, which had sent observers to the 1967 organization meetings, have not yet signed.

Research in Singapore

Under the agreement, a training center will be set up in Thailand, and a research center in Singapore. Japan will contribute experts, vessels, and gear worth about US$1.1 million. Thailand will contribute buildings and land for the center. ("Katsuo-maguro Tsushin," Jan. 19, 1968, and other sources.)

## Survey Indonesian Fishing Grounds

South Korea and Indonesia will conduct a joint fishing survey of Indonesian fishing grounds, from North Sumatra to Halmahera, beginning early in 1968. The 1-year survey was agreed on by the Shin Hung Refrigeration Co. of South Korea and the P. T. Nasantara Djaja Trading Co. of Indonesia.

Shin Hung will provide 40 vessels for the survey and give on-the-job training to Indonesians at sea and at processing plants in Korea. The first 5 vessels of the survey fleet arrived at Tandjung Priok, Djakarta, in January 1968. (U. S. Embassy, Djakarta, Nov. 10, 1967, and Jan. 16, 1968.)

## Japanese-Italian Tuna Mothership Reports Good W. African Fishing

The 1,294-gross-ton, portable-boat-carrying tuna mothership, "Tuna No. 1", reported good fishing in early January 1968 in the Gulf of Guinea off West Africa. It averaged 8.5 metric tons (predominantly yellowfin) per set.

The vessel is owned jointly by Hoko Suisan Fishing Co. and an Italian firm. It departed Italy for West African waters in October 1967. So far, it has made 40 sets and is expected to attain its catch target of 850 tons by the end of March 1968. The catch will be brought to Las Palmas, Canary Islands, for transshipment to Italy.

The Joint Company

The joint company, established in Italy, became operative in July 1967. The 2 parties had agreed that the Japanese firm would fish and the Italian partners would sell the catches to Italian packers. ("Katsuo-maguro Tsushin," Jan. 17, 1968, and other sources.)

## FAO Conference on Fishing Research Vessels — Seattle, May 18-24

Fishing research vessels will be subject of the Second FAO Technical Conference on Research Vessel Craft to be held at the Pacific Science Center in Seattle, Wash., May 18-24. The Conference is cosponsored by BCF and FAO's Fisheries Division. Jan-Olof Traung, Chief of FAO's Fishing Boat Section, will coordinate conference.

The planners expect several hundred participants from many nations to discuss: "vessel requirements as related to work objectives, vessel requirements as related to operational conditions, general operational problems, operational costs versus scientific output, and new methods of data retrieval from the oceans." Also to be examined are "problems of working at sea and general problems of platforms from which increased knowledge of the ocean's biological potential can be acquired."

The First Research Vessel Design Forum was held in Tokyo in September 1961. Twelve nations participated.

A conference spokesman said the May meeting will interest all leading fishing nations and those doing general oceanographic research. He hopes that several U. S. and foreign research vessels will be available to the conference.

For information, write to Donald Johnson, Regional Director, BCF, Seattle, Washington 98105.

## Sockeye and Pink Salmon Predictions for 1968

The International Pacific Salmon Fisheries Commission predicts an off-year for sockeye salmon catches but a good year for pinks. This year is expected to be poor for all Fraser River sockeye races, except possibly the Chilko. Sockeye production in the Skeena system may be better than average but not as good as 1967.

The U. S. and Canada each may harvest a sockeye catch of 500,000 fish in Convention waters. Strong runs of pink salmon are predicted from northern Queen Charlotte Islands south to Johnstone Strait. The Skeena system expects a run of 1.9 million pinks. ("Facts on Fish," Jan. 26, 1968.)

## FAO Orders 2 Multipurpose Fishing Vessels in Norway

The Food and Agriculture Organization of the United Nations has ordered 2 multipurpose fishing vessels from a Norwegian shipyard for delivery late this year and early 1969. The 107-foot vessels will be equipped for trawling and purse seining. They will be used to develop pelagic fishing off Colombia and Argentina under the auspices of FAO and oceanographic research institutes of the two nations.

The vessels also are to be equipped for training deep-sea fishing crews and for oceanographic research. Each vessel will have cabins for 18. Freezing holds will measure 127 cu. meters. Most fishing gear will be Norwegian make. (Export Council of Norway, Feb. 1968.)

## Symposium on Marine Food Chains, Denmark, July

An International Symposium on Marine Food Chains (Tropho-Dynamics of Marine Communities) is scheduled for July 23-27, 1968, in Aarhus, Denmark. It is being held under the auspices of the International Council for the Exploration of the Sea (ICES) with the support of FAO, UNESCO, and ICNAF.

The tentative program is: (1) Biological variations and behavior relevant to feeding, capture, and reproduction, (2) Food web structure, particularly covering the re-use of nonliving organic matter, the benthos, and the food requirements of fish stocks, (3) Methods for measuring field indices of viability and productive potential, and experimental studies pertinent to food chain dynamics, (4) Theoretical and experimental models for developing and testing concepts in tropho-dynamics. (ICES)

## 17th Int'l Congress of Limnology, Jerusalem, August

Jerusalem is the meeting place for the 17th International Congress of Limnology, Aug. 12-19, 1968. Several hundred delegates are expected to attend.

The agenda includes 2 lectures: the Baldi Memorial Lecture, and one on The Dead Sea. Symposia include Salt and Brackish Inland Waters, Tropical and Subtropical Lakes, and the Fish Pond as a Limnological Model. (U. S. Embassy, Tel Aviv, Feb. 6, 1968.)

## North Pacific Fur Seal Commission to Meet in Moscow

The eleventh annual meeting of the North Pacific Fur Seal Commission (Canada, Japan, U. S., and USSR) will be held in Moscow starting April 8, 1968. The Commission will consider whether pelagic sealing, prohibited under the Convention, can be allowed under certain conditions without endangering fur-seal populations.

The member nations had agreed to allow the U. S. and the USSR to harvest the animals on land--and that Canada and Japan were each to receive 15 percent of the annual take of seal skins.

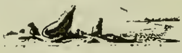
Japan Dissatisfied

Japan is strongly dissatisfied with the Convention's restriction on pelagic sealing. She can be expected to insist on permitting this method of harvesting. She claims that North Pacific fur seals have increased significantly

in recent years. She maintains they are causing damage to fishery resources through predation on North Pacific salmon and other fish off northeastern Japan.

Japan Supports Pelagic Sealing

Japan's position supporting pelagic sealing is: (1) years of study have shown that seals captured at sea produce better quality skins; (2) the improved capturing technique developed in recent years will reduce loss in seal skin value resulting from skin puncture; it will minimize retrieval problems caused by sinking of killed animals; and (3) better knowledge has been gained on fur seal habitats; this will help resolve the problems associated with pelagic sealing. ("Suisan Keizai Shimbun," Feb. 8, 1968.)



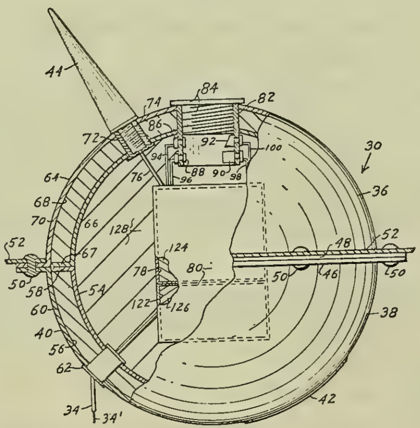
## NEW BOOK ON NORTH PACIFIC FISHERIES TREATIES

The School of Law, University of Washington (Seattle), has published a book that "is the most comprehensive symposium of the legal, political, and economic aspects of fisheries in the North Pacific that has ever been published . . . a valuable guide for legal scholars, politicians, economists, the fishing industry, and others who are interested in international fisheries."

"North Pacific Fisheries Symposium," 1967, 307 pp., $3.50.

## RESCUE BEACON FOR ALL CRAFT

"An emergency radio beacon for any land, sea or aircraft designed to begin transmitting automatically if the vehicle crashes or is damaged (as from fire) was patented recently by Calvin L. Yandell of Fontana, Calif. The unit is 'shockproof, fireproof and foolproof,' says the inventor, and will work even if it is thrown completely clear of the vehicle. The unit, which looks rather like a World War II mine, goes on when a cable that extends along the vehicle is broken, or it can be turned on manually.




"Half a dozen layers of casing and insulation are intended to armor the transmitter against just about anything, possibly including even a direct hit. The outermost layer is noncorroding metal, to protect the unit from exposure. Next comes a thick heat shield of granulated asbestos, a second layer of metal, a shock-absorbing jelly, the steel housing for the transmitter, an electrically insulating material that fills all the empty space in the housing and the radio itself."

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# FOREIGN

## CANADA

### SEAL SEASON SHORTENED

The 1968 sealing season in the "Front" area on Canada's east coast--the Labrador and eastern Newfoundland coastline--will be shortened by 15 days, and in the Gulf of St. Lawrence by 11 days.

By international agreement, Canada and Norway will begin to take harp and hooded seals on the "Front" March 22, ten days later than in 1967. The area will close on April 25, five days earlier than last season.

ICNAF Conservation Measures

Discussions of seal conservation measures were initiated at the annual meeting of the International Commission for the Northwest Atlantic Fisheries (ICNAF) at Boston, Mass., in June 1967. These were followed by a meeting of interested countries at Hamburg, Germany, in October 1967.

In the Gulf of St. Lawrence, where Canada alone takes seals, the 1968 season will open March 18 (it opened on March 7 in 1967). It will close on April 25, as last season. (Canadian Department of Fisheries, Dec. 27, 1967.)

* * *

### MAY ESTABLISH A NEW MARKETING AGENCY

Canada may establish a freshwater fisheries marketing agency to assist that sector of the fishing industry, which is having difficulties, particularly in selling to the U. S. market. Discussions about creating such an agency began in fall 1966. The latest series of talks was scheduled for February 1968, when officials of the Federal-Provincial Freshwater Fisheries Committee were to meet. (Dept. of Trade and Commerce, Canada, Jan. 24, 1968.)

* * *

### FUR SEAL PRICES RISE SLIGHTLY

At the Jan. 25, 1968, fur seal sale in Montreal, prices advanced somewhat over the previous Canadian sale in September 1967. Price comparisons (in U. S. dollars) are shown in table. Also included are the prices received at the most recent U. S. sale in September 1967.

| | Canada | | U. S. |
|---|---|---|---|
| | Jan. 1968 | Sept. 1967 | Sept. 1967 |
| Dressed, Dyed, Machined, Finished. | $ 79.45 | $ 69.59 | $ 82.73 |
| Lakoda (Sheared): | | | |
| Natural . . . . . . . | 30.80 | 23.42 | 31.84 |
| Sandrift . . . . . . . | 41.33 | None sold | 86.20 |

* * *

### 1967 COLD-STORAGE HOLDINGS

Canada's Bureau of Statistics reported on Jan. 29, 1968, cold-storage holdings of selected fishery products on Dec. 31, 1967, and 1966:

| | Dec. 31 Stocks | |
|---|---|---|
| | 1/1967 | 1966 |
| | . . . (1,000 Lbs.) . . . | |
| Halibut Pacific: | | |
| dressed . . . . . . . . . . . . . . . . | 8,652 | 8,445 |
| fillets . . . . . . . . . . . . . . . . | 301 | 191 |
| steaks . . . . . . . . . . . . . . . . | 72 | 57 |
| Salmon Pacific . . . . . . . . . . . . | 6,248 | 8,624 |
| Fillets: | | |
| Atlantic cod . . . . . . . . . . . . . | 1,629 | 4,074 |
| Haddock . . . . . . . . . . . . . . . | 2,139 | 2,445 |
| Ocean perch . . . . . . . . . . . . . | 6,026 | 6,494 |
| Soles2/ . . . . . . . . . . . . . . . | 6,891 | 5,751 |
| Blocks and slabs . . . . . . . . . . . | 12,227 | 17,180 |
| Fish sticks . . . . . . . . . . . . . . | 341 | 594 |
| Portions . . . . . . . . . . . . . . . | 952 | 690 |
| Scallops . . . . . . . . . . . . . . . | 526 | 1,900 |
| Other frozen fish and shellfish . . . . . | 21,461 | 20,639 |
| Total frozen fresh . . . . . . . . . . | 67,465 | 77,084 |
| Total smoked . . . . . . . . . . . . . | 1,382 | 1,376 |
| Total bait and animal feed . . . . . . | 14,906 | 15,478 |
| Grand Total . . . . . . . . . . . . | 83,753 | 93,938 |

1/Preliminary.
2/Including all small flatfish.

* * *

### GOVERNMENT PRINTS BOOKLET ON CARE OF FISH IN RETAIL STORES

A 24-page booklet, "The Care of Fish in Retail Stores," published recently by the Canadian Department of Fisheries, has been well received by retailers and food distributors.

The booklet contains information useful to retail outlets and supermarkets. The meat manager of a Toronto supermarket chain said the booklet will help sell more fish by better informing retail sales personnel on the quality of fish, how to display it, and how to care for fresh and frozen fish.

Copies are free and may be obtained from the Information and Consumer Service, Department of Fisheries, Ottawa, Province of Ontario, Canada. ("Fisheries of Canada," January 1968.)

# EUROPE

## 1967 Salmon Catch Off Greenland Near 1964 Record

The 1967 catch of salmon in Greenland waters will total about 1,360 metric tons, close to the record 1964 catch of 1,387 tons. The offshore fishery catch more than tripled the 1966 figure. It was due to greater Norwegian and Danish participation.

Preliminary Greenland Salmon[1] Catch, 1967 and 1966

| | 1967 | 1966 |
|---|---|---|
| | . . . . . . . (Metric Tons) . . . . . . | |
| Shore fishery: | | |
| Purchases by: | | |
| Royal Greenland | | |
| Trade Dept. . . . . | 589 | 614 |
| Private operators . . | 491 | 533 |
| Total . . . . . . . . | 1,080 | 1,147 |
| Offshore fishery: | | |
| Norwegian vessels . . | (4 vessels) 100 | (1 vessel) 18 |
| Faroese " . . | (3 " ) 100 | (1 " ) 70 |
| Danish drift-netters . | (4 " ) 80 | (no vessels) - |
| Total . . . . . . . | 280 | 88 |
| Grand Total . . . | 1,360 | 1,235 |

1/Eviscerated fish with heads on.

### Poor Weather Reduced Catch

Although more vessels participated in the 1967 offshore fishing, extremely poor weather reduced fishing effectiveness. Gill nets are fished at the surface and tend to tangle in bad weather. They also drift readily and prove very hard to recover at times.

About 100 salmon tagged as smolts were recaptured in the West Greenland fishery. No information is available yet on countries of origin.

### Tagging Program

The ICES/ICNAF joint onshore tagging program successfully tagged 370 salmon. Northumberland T-nets were tried in an attempt to secure an increased percentage of taggable fish. This gear, a floating trap net with lead running to the beach, proved relatively ineffective. This was due partly to poor weather and rough seas. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 21, 1968.)

## Iceland

### 1967 CATCH DECLINES

Iceland's total 1967 catch of about 901,000 metric tons was 27.3 percent below the 1966 catch of 1,240,000 tons. Contributing factors were difficult weather conditions and the unpredictable movements of herring shoals.

The 1967 catch was slightly less than the 971,600 tons of 1964--and well under the record catches of 1965 and 1966.

| | 1967 | 1966 |
|---|---|---|
| | . .(1,000 Metric Tons) . . | |
| Herring . . . . . . . . . . . . | 470 | 769 |
| Capelin . . . . . . . . . . . . | 97 | 125 |
| Groundfish . . . . . . . . . . . | 330 | 339 |
| Lobster & shrimp . . . . . . . . | 4 | 5 |

Although a final estimate is not yet available, it is assumed that the manufacture of fishery products (output) for 1967 declined by at least the same percentage. (U. S. Embassy, Reykjavik, Jan. 18, 1968.)

* * *

### TEMPORARY SOLUTION FOUND TO FISH PLANT SHUTDOWN

In the last week of January 1968, the Freezing Plants Corporation and the Icelandic Federation of Cooperative Societies shut down their member plants due largely to operating deficits. In recent discussions with these groups, the Government proposed as its final offer subsidy assistance of 199 million kronur (US$3.5 million). Although the plants rejected this proposed sum as "unacceptable," they agreed to resume production on the basis of the Government's proposals only during the 1968 winter fishing season.

An earlier Government decision to increase 1968 prices on raw white fish by 10 percent above 1967 prices (including subsidies) increased in effect raw material costs to freezing plants. (This happened at the same time Government subsidies were to be abolished.) The action brought on the plant shutdown.

### Assistance Exceeds Budget Surplus

In addition to plant assistance, the Government proposed 124 million kronur ($2.2 million)

Iceland (Contd.)

for fishing vessel owners to help meet interest and loan repayments on capital investment. Thus, total assistance to the fisheries is projected at 323 million kronur ($5.7 million). This is a good deal more than the anticipated 250 million kronur ($4.4 million) budgetary surplus estimated for 1968. The surplus had been earmarked to compensate for loss of revenue from proposed tariff reductions.

To Curb Treasury Outlays

In a press interview on Jan. 30, 1968, the Minister of Finance stated that it had been "hoped the devaluation would suffice for the fisheries, although it was clear that the freezing plants would not be satisfied without some transfer payments. It was also known that the fisheries owners would have to be supported if the lot of the fishermen were improved." As to how the Government is going to finance assistance to the fisheries, he stated that "a drastic revision of all state expenditures along with measures to curb Treasury outlays could not be avoided."

Dropping proposed tariff reductions is not feasible, according to the Government, because early reductions are inevitable in order to bring Icelandic tariffs into line with existing tariffs in other countries. Reductions also are necessary to arrive at acceptable agreements with EFTA and EEC. (U. S. Embassy, Reykjavik, Feb. 1, 1968.)

## United Kingdom

INTEREST IN OCEANOGRAPHY GROWS

The Natural Environment Research Council (NERC) reports growing interest in marine sciences. The NERC considers itself the "prime coordinator of marine scientific research" in the United Kingdom.

NERC's second annual report (for April 1, 1966-March 31, 1967) reviews the Council's efforts to examine and coordinate its different research programs and to develop policies. Major new developments are planned in 4 previously neglected areas: (1) coastal oceanography, (2) coastal geology and ecology, (3) geology of the continental shelf, and (4) hydrology and biology of inland waters.

Funds for Research

In oceanography and fisheries, the Council urges increased effort. After a national review of potential economic and scientific benefits, the NERC expects to double its financial support of research in the marine sciences in the next 4 years. From US$4.2 million in 1966-67, support will increase to about $9.8 million in 1972. This is considered the maximum consistent with available staff and facilities. Increased aid already has been given to university postgraduate programs and to improve research facilities.

5 Vessels Needed

NERC anticipates a need for 5 new research vessels over the next 5 years: one for biological and a second for geological research, to be used jointly with the universities; 2 smaller vessels for coastal work; and a 2-man submersible capable of operating at 100 fathoms along with a support vessel.

The British Antarctic Survey, a recent addition to NERC, also is expected to need a new vessel by about 1970. It is likely that the Survey will expand its oceanographic research in the Antarctic.

The interest of NERC in marine sciences as a source of future economic and scientific benefits is endorsed by the Council for Scientific Policy. The Council has recommended in its latest report on science policy that NERC's budget be increased at a yearly average of 16.5 percent over the next 3 years. (U. S. Embassy, London, Jan. 27, 1968.)

## USSR

NEW AQUARIUM NEAR BLACK SEA

A large aquarium has been built at Batumi, Georgian Republic, on the shores of the Black Sea. It has over 2,000 fish from the Black Sea and inland waters of the Caucasus. Scientists from the Georgian Fisheries Research Laboratory will conduct basic research on the nearly extinct Atlantic sturgeon. This fish can weigh up to 600 lbs. (Caspian sturgeon reach only 110 lbs.) The Atlantic sturgeon

USSR (Contd.):

yields 5 to 6 times as much caviar as the Caspian. Only about 1,000 specimens of Atlantic sturgeon are known to exist in the mouth of the Rioni River, where the Soviets plan to build a sturgeon hatchery.

Caspian and Pacific fur seals also are being studied at the aquarium. Both species have been kept alive in captivity. Both readily eat frozen fish, although prior Japanese research indicated fur seals are more demanding about their food. The Soviets hope that both species will reproduce in captivity and establish a basis for commercial breeding. ("Trud," Dec. 19, 1967.)

## Portugal

CANNED FISH PACK UP, EXPORTS DOWN

The Portuguese publication "Conservas de Peixe," Nov. 1967, reported the pack and export of canned fish in Jan.-Sept. 1967 and 1966:

| | Pack | | | |
|---|---|---|---|---|
| | 1967 | | 1966 | |
| | Jan.-Sept. | | Jan.-Sept. | |
| | Metric Tons | 1,000 Cases | Metric Tons | 1,000 Cases |
| In oil or sauce: | | | | |
| Sardines | 26,496 | 1,394 | 26,984 | 1,420 |
| Chinchards | 2,378 | 125 | 1,104 | 58 |
| Mackerel | 6,540 | 261 | 5,994 | 240 |
| Tuna & tunalike | 6,165 | 206 | 3,490 | 116 |
| Anchovy fillets | 3,467 | 347 | 3,688 | 369 |
| Others | 1,187 | 63 | 704 | 37 |
| Total | 46,233 | 2,396 | 41,964 | 2,240 |
| | Exports | | | |
| Sardines | 36,824 | 1,938 | 36,262 | 1,908 |
| Chinchards | 1,200 | 63 | 492 | 26 |
| Mackerel | 4,782 | 191 | 7,623 | 305 |
| Tuna & tunalike | 1,582 | 53 | 2,109 | 70 |
| Anchovy fillets | 3,199 | 320 | 2,988 | 299 |
| Other | 643 | 34 | 597 | 31 |
| Total | 48,230 | 2,599 | 50,071 | 2,639 |

## Denmark

NEW SHRIMP FISHERY POSSIBLE

Exploratory fishing has demonstrated the existence of commercial stocks of brown shrimp (Crangon vulgaris) in shallow protected waters between Esbjerg and Havneby, Denmark. Denmark has not used this species, although it is highly regarded in Germany, France, Belgium, and the Netherlands. The exploratory effort was inspired by cooperation between one of West Germany's largest shrimp suppliers in Cuxhaven and an Esbjerg exporter. The Cuxhaven firm agreed to purchase all brown shrimp the Danish fishery could produce.

Dutch Trawl Used

Biologists at the Danish Ministry of Fisheries originally opposed beam-trawling for shrimp in the shallow-water areas off Denmark's west coast. They feared the likelihood of damage to substantial stocks of young fish that use these waters for rearing. The beam-trawl was tested. So was a specially built "shovel trawl." But attention centered quickly on the Dutch double cod-end beam trawl. This separates the shrimp from the small fish and permits the fish to escape. (For description of this net, see "World Fishing," June 1965.)

Tests of the new Dutch trawl demonstrated its suitability for Danish conditions. A biologist-observer of the exploratory fishing was enthusiastic about the gear. (Regional Fishery Attaché, U. S. Embassy, Copenhagen, Jan. 30, 1968.)

## Norway

POSSIBLE DEPLETION OF SALMON STOCKS FEARED

An expanding salmon fishery off the Norwegian coast from Bergen to Finnmark has caused concern in fishing circles that the country's valuable salmon stocks are being depleted. The chief of the Norwegian Directorate for Hunting, Wildlife, and Freshwater Fisheries says there is clear evidence that salmon are being overfished as a result of the new fishery. Because salmon propagation work takes place only in rivers, he points out, rivers should be assured an adequate part of the run. Instead, the river part of the catch has declined from 15 percent to 10 percent in the last decade. The chief noted that the new fishery can only be regulated by international agreement. He urged that negotiations

Norway (Contd.):

begin soon with Denmark, Canada, and the Soviet Union.

Fishery Fairly New

The fishery began in the early 1960s as a drift-net fishery, but several Danish long-line boats participated in 1966. In 1967, about 20 Danish long-liners, one or two Swedish boats, and some Faroese and Norwegian vessels, fished salmon in the area. The vessels fished from about 12 miles to 200 miles offshore. They began in April and continued through most of June.

Preliminary data show a catch of 100 to 200 metric tons in 1967. More vessels, particularly Norwegian, are expected to participate during 1968. Several fishermen from the Danish port of Esbjerg plan to return to North Norway this year. They have been negotiating to convert a large steel cutter to mothership operations. This would save much time and many trips from fishing grounds to Denmark--because Norway does not permit the Danes to land their catches for transshipment. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 30, 1968.)

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## PRICE DECLINE HITS KLIPFISH EXPORTS

Norwegian exports of klipfish (dried, salted cod) for 1968 are expected to total about 40,000 metric tons, about the same as in 1967. However, the value probably will be much lower because of declining prices for it on the world market. The Norwegian market in Brazil particularly has been affected by lower prices.

Depressed world prices for klipfish may be a result of competitive sales by Faroese and Icelandic suppliers. The latters' position has been enhanced by currency devaluation. (Regional Fishery Attaché, U. S. Embassy, Copenhagen, Jan. 30, 1968.)

* * *

## REPORT ON 1966-67 LANDINGS AND VALUE

The Norwegian publication "Fiskets Gang," Dec. 28, 1967, reports these data on landings and value for 1966 and 1967:

| | 1/1967 | | 2/1966 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | Metric Tons | US$ 1,000 | Metric Tons | US$ 1,000 |
| Herring . . . . . . | 1,206.3 | 38,230 | 1,185.8 | 56,784 |
| Mackerel . . . . . | 881.2 | 27,436 | 483.9 | 25,659 |
| Capelin . . . . . . | 402.8 | 5,859 | 379.6 | 9,541 |
| Saithe . . . . . . | 123.9 | 12,079 | 142.6 | 13,461 |
| Cod . . . . . . . . | 192.4 | 35,565 | 197.0 | 36,853 |
| Other . . . . . . . | 209.3 | 39,608 | 264.7 | 45,448 |
| Total . . . . . | 3,015.9 | 158,777 | 2,653.6 | 187,746 |

1/Preliminary.
2/Revised.

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## USE OF INDUSTRIAL FISH LANDINGS IN 1967

Norway's utilization in 1967 of industrial fish landings by selected species is reported by "Fiskets Gang," Jan. 4, 1968:

| | Total Landings | Iced Fresh | | Freezing | | Salted | Canned | Animal Food | Meal & Oil |
|---|---|---|---|---|---|---|---|---|---|
| | | Export | Domestic | Edible | Bait | | | | |
| | (1,000 Metric Tons) | | | | | | | | |
| Herring . . . . | 1,199.4 | 19.9 | 4.0 | 33.5 | 6.5 | 31.7 | 18.4 | 0.1 | 1,085.2 |
| Capelin . . . . | 415.3 | - | - | - | - | - | - | - | 415.3 |
| Norway pout. . | 21.8 | - | - | - | - | - | - | 9.8 | 12.0 |
| Brisling . . . . | 74.5 | 2.7 | - | - | - | 0.1 | 69.9 | 0.5 | 1.2 |
| Mackerel . . . | 77.7 | 0.1 | 0.3 | 1.1 | 0.3 | 0.3 | 0.2 | - | 75.3 |

Note: Original data converted from hectoliters (hl.) using 93 kilos=1 hl. for all species except capelin (100 kilos=1 hl). Totals many not add due to rounding.

# LATIN AMERICA

## Peace Corps Wants 60 Biologists for Fisheries Projects

The Peace Corps is seeking 60 "qualified, fisheries-oriented" biologists to work in fisheries development programs in Chile and Central America. The programs will be associated with FAO fishery development projects.

Training will begin in June 1968. Primary study areas in current projects are: development of fishing production cooperatives; fishery research and fish culture efforts; and fishing community development. The 3-month training program in the U. S. includes language and study of fisheries in the countries to which volunteers are assigned for 2 years. They will work closely with native fishermen and officials.

### Where Application Forms Available

Application forms are available at U. S. Post Offices and at Civil Service Commission offices. Applicants should apply soon to be considered for the June training programs. They should pay special attention to Question 14--"Area of Preference"--and state their interest in going to Latin America.

For more information, write to: Norman Moe, Peace Corps/Chile, Room 419, The Peace Corps, Washington, D. C.; or Harold Loesch, FAO Central American Fisheries Development Project, Room 344, The Peace Corps, Washington, D. C.

## Mexico

### CONSUMPTION OF SHRIMP INCREASES

Between 1957 and 1966, Mexican consumption of shrimp increased about 9 percent each year. This fact is notable because it shows increasing consumption of domestically produced fish. Domestic consumption was about 18 percent of total Mexican production over the past 10 years, but this has increased in recent years. For example, domestic consumption was 20 percent of the catch in 1963, 23 percent in 1964, 24 percent in 1965, and 25 percent in 1966. Per-capita consumption of shrimp rose from $\frac{1}{3}$-lb. in 1957 to over $\frac{1}{2}$-lb. in 1966. ("Actividad Pesquera," Nov. 10, 1967.)

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### CATCH WAS UP IN FIRST 9 MONTHS OF 1967

The Mexican fishery catch from January-September 1967 totaled 168,892 tons--19,753 tons above the 1966 period.

The greatest catch increases were: sardine, 63 percent; anchoveta, 83 percent; tuna, 58 percent; turtle, 141 percent; charal (fresh water silverside), 33 percent; spiny lobster, 53 percent; sharks, 28 percent; red snapper, 33 percent; mackerel, 9 percent; mullet, 16 percent; croaker, 11 percent; schoolmaster, 4 percent; mojarra (a perch), 4 percent; and snook, 2 percent.

Catches declined for grouper, totoaba, wahoo, and oysters. ("Actividad Pesquera," Nov. 10, 1967.)

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### BUILDING MAJOR YUCATAN PORT

Mexico is building a port near Progreso on the Yucatan Peninsula. June 1968 is the planned completion date. Its main purpose will be to offer fishing vessels protection in stormy weather. Current facilities are a wharf on an open roadstead.

The new harbor will be built in a swamp separated from the sea by a strip of land. The basic construction plans are to dig a channel through the strip so vessels can come into the swamp. Fishing from the port should expand--with increased production of snappers and mero for the U. S. market. ("Mexico City News," Jan. 19, 1968; Regional Fisheries Attaché, U. S. Embassy, Mexico.)

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### MAZATLAN BOATYARD IS BUSY

Mexico's Astilleros Unidos del Pacifico, a Mazatlan boatyard, will build 21 fishing vessels during 1968. Total value will be US$1,798,800. Nineteen of the vessels will be exported to Japan, Korea, and Venezuela.

Mexico (Contd.):

During January 1968, orders were received for 2 shrimp trawlers for the United Kingdom, 4 for Brazil, and 17 for the Mazatlan fleet. Also, a $91,000 yacht was ordered by a U. S. company.

20 Shrimp Trawlers in 1967

During 1967, 20 shrimp trawlers were built worth US$1,440,000. Seven went to the local fleet and 13 to Brazil and Venezuela. Also, 243 vessels were repaired at a cost of US$260,000.

Further modernization of the shipyard is expected. ("El Heraldo," Jan. 15, 1968; Regional Fisheries Attaché, U. S. Embassy, Mexico, Jan. 24, 1968.)

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FRENCH TRAWLER CREW TO TEACH DEEP-WATER SHRIMP TRAWLING

The French trawler "Louis Caubriere" was expected to arrive in Mazatlan in late January to teach Mexican fishermen deep-water trawling for shrimp. The vessel is part of the fishery protocol signed by France and Mexico in mid-1967. Under it, French companies will furnish fishing vessels and machinery to develop Mexico's fishing industry.

French officials were in Mazatlan and enthusiasm was reported high to begin the venture. The freezing plant designated to handle the shrimp taken by the French vessel was ready to begin processing. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Jan. 24, 1968.)

## Peru

CHIMBOTE IS WORLD'S NO. 1 PORT IN LANDINGS

Chimbote, the Peruvian port where most anchoveta are landed, has the highest landings of any fishing port in the world. This has produced a problem. Although fishermen, processors, and other groups in the fishing industry say they are optimistic, it seems likely that several fish meal plants--the primary source of employment--will have to close permanently because of world prices for fish meal.

The tuna canning operations in Chimbote belong to the past: 69 canneries operated in 1963, today no more than 5. The largest cannery is closed. Another moved to Trujillo. Only Pesquera Chimbote and 4 very small canneries are producing bonito--and this only intermittently. An inadequate bonito fleet, strikes, demands for increased wages, and labor legislation improperly suited to seasonal operations, such as bonito fishing, have doomed this once-flourishing industry.

Fish Meal Plants Operate

The fish meal plants are operating, most at capacity. They have benefited from devaluation of the "sol" and from new tax benefits.

One plant was occupied by workers and closed down, apparently after the Industrial Bank refused credit. Pesquera del Santa and Fray Martin are producing alfalfa meal, using old fish-meal equipment. Costa Atunera, S. A., is producing meal from cannery offal and shipping the meal to Spain and Italy. Apparently, the product is well accepted there ("Pesca," October 1967.)

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REPORT ON FISH MEAL AND OIL PRODUCTION

Peruvian fishing was excellent in November and December 1967. Production and shipments were high. Stocks were 510,431 metric tons on Nov. 30, and 598,513 tons on Dec. 15 (a record for that date).

Table 1 - Fish Meal Production Through Mid-December 1967

| | Nov. | Dec. 1-15 | Sept. 1-Dec. 15 | Jan. 1-Dec. 15 |
|---|---|---|---|---|
| | (Metric Tons) | | | |
| Fish meal production | 241,017 | 147,308 | 672,829 | 1,703,294 |
| Fish meal shipments | 160,988 | 58,527 | 439,914 | 1,452,411 |
| Local sales & other uses | 3,265 | 699 | 1/ | 27,535 |

1/Not available.

Table 2 - Fish Oil Exports Through November 1967

| | Nov. | Sept.-Nov. | Jan.-Nov. |
|---|---|---|---|
| | (Metric Tons) | | |
| Semirefined | 11,866 | 15,535 | 119,118 |
| Crude | 10,127 | 10,663 | 61,231 |
| Total | 21,993 | 26,198 | 180,349 |

Peru (Contd.):

| Table 3 - Fish Meal Exports Through Mid-December 1967 | | | | |
|---|---|---|---|---|
| Zone and Area | Nov. | Dec. 1-15 | Total Jan. 1-Dec. 15 | Percentage of Total |
| | . . . . . .(Metric | Tons) . . . . . | | % |
| I -U.S. & Canada | 37,831 | 23,650 | 411,657 | 28.3 |
| II -Latin America | 11,583 | 2,800 | 85,692 | 5.9 |
| III-Far East | 11,811 | 4,376 | 53,972 | 3.7 |
| IV-East. Europe | 28,600 | 8,100 | 230,792 | 15.9 |
| VI-West. Europe | 47,559 | 12,051 | 407,500 | 28.1 |
| VI-West Germany | 23,604 | 7,550 | 262,798 | 18.1 |

As of Dec. 15, 1967, 106 plants were operating; 53 were closed; and 9 had been dismantled.

At the end of 1967, over 600,000 tons were in stock. (U. S. Embassy, Lima, Jan. 25, 1968.)

## Colombia

### REPORT ON CARIBBEAN COAST'S FISHING INDUSTRY

The fishing industry on Colombia's north coast is coastal, poorly organized, and primitive. Most fishing is done from canoes or from beaches. Fishermen use nets or lines with varying numbers of hooks; in inland lakes and rivers, they sometimes use lights and dynamite (both illegal) and spears; they dive for lobster. About 10,000 people are engaged in traditional fishing in the region.

Commercial fishing is centered in Cartagena, Barranquilla, Santa Marta, and Riohacha. Reportedly, 27 seagoing fishing boats with average displacement of 12 tons are engaged in commercial fishing. These boats usually employ lines rather than nets. Their catch is preserved with block ice. There are ice plants in Turbo, Cartagena, Barranquilla, and Santa Marta.

#### Fish Canning and Freezing

The fish canning and freezing industry on the north coast is concentrated in Barranquilla and Santa Marta. The plants are supplied by the 27 vessels. They also send trucks and agents to buy from fishermen.

In 1962 north coastal packers canned 521 metric tons of fish and froze 1,407 tons. By 1965, the totals had risen to 825 tons canned and 1,825 tons frozen. This is a small part of the total catch--estimated at 22,988 tons in 1962 and 24,472 in 1965. About 25 percent of this catch was robalo (snook).

#### Area's Potential Being Studied

The commercial fishing possibilities of the north coast of Colombia are being studied by a company called Pesquera Nacional. It is owned and organized by the Corporacion Financiera del Norte, ESSO Colombiana, Envases de Colombia, and others. It has hired a boat to fish those waters for a year.

In 1967, local interest in commercial fishing increased. It is directed especially to export oysters, shrimp, and spiny lobster to the U. S. and Puerto Rico. Exports are small. The largest shrimp exports are from Cartagena, canned oysters from Barranquilla, and spiny lobsters from Riohacha via Barranquilla. (U. S. Consulate, Barranquilla, Jan. 17, 1968.)

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### GETS UNDP/FAO FISHERIES DEVELOPMENT PROJECT

A project for a marine fisheries development study was accepted on Dec. 17, 1967, by the Colombian Minister of Agriculture, the United Nations Development Program (UNDP), and FAO. Colombia had asked for UN Special Fund Assistance. The costs of the 4-year program, about US$2 million, are to be shared about equally by Colombia and the UN.

The project will: (a) provide advisory services to Government and industry to strengthen fishery administration, review factors affecting industry development, and to organize fishery research; (b) conduct surveys and experimental fishing to assess available resources and develop efficient methods of exploiting them; and (c) provide fellowships in fishery biology and fishing techniques.

#### Operation of Projects

Project headquarters will be in Bogota. Two permanent field stations, in Buenaventura and Cartagena, will be built with Colombian funds. The Government will be assisted in evaluating existing fishery policies, laws, regulations, and practices. It will act to improve these.

Colombia (Contd.):

The Government will establish, under the Ministry of Agriculture, a National Fisheries Research and Development Center to be project headquarters, and a Committee on Project Coordination and Supervision to support the industry.

The magnitude and biological characteristics of the resources in Colombian waters will be studied--and the efficient means to exploit them. Exploratory tests will be conducted by a fully equipped UN vessel.

Studies of the economics of the industry will be carried out. Local staff and fisheries people will be advised and trained.

What UN and Colombia Provide

The UN Special Fund will provide: (a) 264 man-months of expert service; (b) fellowships at estimated cost of $30,000; (c) equipment and supplies not over $401,000; (d) miscellaneous, estimated $30,000.

Colombia will provide: (a) 694 man-months of professional staff service; (b) 1,042 man-months of nonprofessional staff service; (c) land and buildings, estimated $92,369; (d) equipment and supplies, estimated $332,369; and (e) miscellaneous, estimated $33,920. (U. S. Embassy, Bogota, Feb. 8.)

## Brazil

EXPANDS FROZEN FISH EXPORTS

A report indicating the availability of frozen catfish in Brazil for export resulted in 10 direct inquiries; two of these were followed by action. Two companies formed to export the fish are thriving--Productos de Pesca do Para, S. A., and Atlantics Pesca Ltda., both in Belem, Para.

The two are exporting annually about 800 metric tons of frozen catfish steaks and fillets to the U. S., destined for market in south central U. S. Most of the fish enters through New York City. Growth of this trade has encouraged increases in catch. At least one other firm is building facilities to process catfish for export. (U. S. Embassy, Rio de Janeiro, Jan. 10, 1968.)

The report from the U. S. Embassy coincides with others. According to a report from Atlanta, Georgia, large quantities of Brazilian catfish and croakers have appeared there. Mullet, trout, and other fish are expected soon. After success in marketing them, an Atlanta dealer recently contracted for 250,000 lbs. monthly of frozen dressed Brazilian croakers.

## Chile

REPORT ON 1967 ANCHOVY CATCH, FISH MEAL AND OIL PRODUCTION

The Instituto de Fomento Pesquero has reported the following data for North Chile's anchovy catch and fish meal and oil production in 1967:

| | 1967 | 1966 | 1965 |
|---|---|---|---|
| | . . . . . . (Metric Tons) . . . . . | | |
| Anchovy Catch: | | | |
| Dec. . . . . . . . . . . | 58,800 | 17,900 | 103,200 |
| Jan.-Dec. . . . . . . | 664,740 | 1,047,697 | 422,197 |
| Fish Meal Production: | | | |
| Jan. . . . . . . . . . . | 15,983 | 33,504 | 12,836 |
| Feb. . . . . . . . . . . | 20,294 | 27,113 | 11,371 |
| Mar. . . . . . . . . . . | 7,794 | 13,536 | 10,278 |
| Apr. . . . . . . . . . . | 1,651 | 14,067 | 3,587 |
| May . . . . . . . . . . | 3,447 | 26,754 | 4,090 |
| June . . . . . . . . . . | 16,487 | 18,783 | 2,989 |
| July . . . . . . . . . . | 13,331 | 17,865 | 2,188 |
| Aug. . . . . . . . . . . | 6,054 | 17,978 | 3,651 |
| Sept. . . . . . . . . . . | 11,656 | 11,696 | 794 |
| Oct. . . . . . . . . . . | 11,408 | 2,687 | 888 |
| Nov. . . . . . . . . . . | 6,554 | 1,887 | 1,453 |
| Dec. . . . . . . . . . . | 11,093 | 3,634 | 16,454 |
| Jan.-Dec. . . . . . . | 125,752 | 189,504 | 70,579 |
| Fish Oil Production: | | | |
| Dec. . . . . . . . . . . | 1,278 | 572 | 1,063 |
| Jan.-Dec. . . . . . . | 9,899 | 18,706 | 7,234 |

# ASIA

## Japan

### DEVELOPMENTS IN PURSE-SEINE TUNA FISHERY

The extension of tuna purse seining from around the Japanese home islands to the distant high seas is creating considerable interest. The fishery is divided broadly into one-boat purse seining in the South Pacific Ocean and two-boat seining in the Atlantic Ocean off West Africa. Both are experimental. No purse seiner has been licensed by the Government to engage in full-scale commercial fishing in distant waters. However, the fishery is drawing much attention: license applications (close to 20 one- and two-boat purse-seine units) are filed with the Fisheries Agency. Should the Agency decide to license a full-scale fishery in 1968, it will face a delicate situation licensing vessels.

Distant-Water Fishery

The distant-water purse-seine fishery started in 1962 in the South Pacific off New Guinea. In 1964, an experimental operation was started in the Atlantic off West Africa. In the South Pacific, Taiyo Fishing Co. (with Government support) conducted the first one-boat purse seine skipjack fishing off New Guinea with the power-block-equipped seiner "Kenyo Maru" (260 gross tons). The 1962-63 operation failed because of poor fishing. This resulted in a substantial financial loss for Taiyo and threatened the development of the South Pacific fishery.

However, in 1965, another fishing firm (Ogata Gyogyo) sent to the same region a one-boat seiner, the "Taikei Maru" (210 gross tons). The vessel was diverted from the slow fishing season (December-April) off northeastern Japan. The trip was a success and gave renewed impetus to the fishery.

At present, 4 one-boat purse seiners are operating in that region. Production is reported on target. The vessels and their owners are: "Taikei Maru" (210 gross tons), Ogata Gyogyo; "Nissho Maru" (250 gross tons), Nippon Kinkai Hogei; "Tokiwa Maru No. 58" (350 gross tons), Okura Gyogyo; and "Hayabusa Maru No. 3" (280 gross tons), Taiyo.

West African Grounds

In the West African fishing grounds, various nations have been conducting for many years pole-and-line skipjack fishing. Japan's entry into the purse-seine fishery began in 1964. Nichiro Fishing Co., stimulated by French seining there, began operations with 1 two-boat unit: the seiners "Kuroshio Maru Nos. 81 & 82" (each 145 gross tons). The West African fishery has abundant skipjack. It is profitable if conducted by independent vessels. But with mothership-type operations, it is difficult to meet expenses.

Despite financial setbacks, Nichiro continued its mothership operations. Now it has 4 two-boat seiner units and one mothership ("Chichibu Maru No. 2," 1,639 gross tons). Of the 4 units, 2 are owned by Nichiro and 1 each by Kawajiri Gyogyo and Aizawa Gyogyo. Because of high mothership costs, Kawajiri and Toyo Gyogyo plan to fish experimentally with a large, independent, 500-ton purse seiner. Kawajiri's new 500-ton "Hakuryu Maru No. 55" was headed toward the West African fishing grounds from the eastern Pacific. Another seiner is being built by Toyo Gyogyo and will be sent to W. African waters. The performance of the two vessels will be watched closely by the industry.

Short Purse-Seine History

The Fisheries Agency is moving cautiously with regard to licensing the Atlantic and South Pacific purse-seine fishery on a regular commercial basis because the Japanese purse-seine history in both regions is short. Also, doubt still exists over whether one-boat seining is preferable to two-boat. While one-boat is efficient, it injures fish more and so reduces their market value. It is urgent to divert purse seiners from coastal fisheries to distant waters for 2 reasons: mackerel and skipjack are abundant; there is need to reduce gear conflict in Japanese coastal waters.

5-Year Plan

The Fisheries Agency has prepared a 5-year program to develop new fishing grounds for the purse-seine and other distant-water fisheries. It was drawn up along with commissioning of Government research vessel

Japan (Contd.):

"Kaiyo Maru" (3,200 gross tons). The program includes tuna and mackerel surveys: 1st year (1968)--mackerel survey in South China Sea and skipjack in South Pacific; 2nd year (1969)--skipjack survey off West Africa; 3rd year (1970)--skipjack, west of Australia; 4th year (1971)--skipjack, off west coast of South America; and 5th year (1972)--skipjack, in Indian Ocean.

Industry Plans Too

Based on 5-year program, the Japan Fisheries Society (senior industry leaders) developed a long-range estimate of purse-seine fleet expansion and catch increase by ocean area. According to estimate, there will be a 2-year exploratory survey in 1968-69. This will be followed by the addition of two 500-ton one-boat purse seiners and one two-boat seiner in 1970. The estimated increase in annual tuna catch will be 6,330 metric tons.

In 1975, fleet expansion will bring total to 57 one- and two-boat seiners and production of around 14,000 tons. By 1982, fleet will reach 94 fishing units with catch of 233,000 tons. However, these projections depend on implementing resource surveys under the Government's 5-year resource development program.

Future Promising

Compared with present, fairly new, distant-water purse-seine fishery, the future is promising when tuna resources and availability of fishing grounds are considered. Like deep-water trawl fishery, it will not be affected by trend toward extension of territorial waters by coastal nations. Thus, the purse-seine system used by advanced fishing nations will become more important in Japanese fisheries. It will replace the inefficient long line and hook method. ("Nihon Suisan Shimbun," Jan. 1, 1968.)

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TUNA CANNERS HAVE PROBLEMS

The Japanese tuna packing industry is faced with the difficulty arising from the high cost and scarcity of raw material. Early this year production was lagging, and sales for domestic and export markets had declined.

The export market in the U. S., West Germany, and other countries is weakening. Japanese trading firms are barely able to maintain their share of the canned tuna trade.

U. S. Competition

Concern is being expressed in Japan over the difficulty of boosting exports because U. S. packers are expanding canned tuna production. The U. S. packers have abundant raw material available. Moreover, they have reduced production costs through technological innovations.

To improve Japan's international competitive position, some Japanese trading firms are arranging to supply domestic packers with lower-priced tuna produced by other countries. ("Kanzume Nippo," Jan. 20, 1968.)

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FROZEN TUNA EXPORT PRICES DROPPED IN 1967

The November 1967 average prices for albacore and yellowfin tuna were about the same as October's. Compared with November 1966, the albacore price fell by over US$30 a ton, and yellowfin by about $45 a ton.

The prices of frozen tuna for direct export to the U. S. during August-November 1967 were reported (see table) by the Japan Frozen Tuna Sales Co. ("Suisan Tsushin," Dec. 26, 1967.)

| | | Albacore (round) | | Yellowfin (g.& g.)1/ | | Albacore Loins | | Yellowfin Loins | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1967 | 1966 | 1967 | 1966 | 1967 | 1966 | 1967 | 1966 |
| | | . . . . . (US$/Short Ton, f.o.b. Japan) . . . . . | | | | | | | |
| Nov. | High | 468 | 505 | 413 | 460 | 1,053 | 1,060 | 875 | 940 |
| | Low | 455 | 485 | 395 | 425 | 984 | 1,060 | 849 | 911 |
| | Average | 466 | 499 | 409 | 453 | 999 | 1,060 | 854 | 932 |
| Oct. | High | 475 | 502 | 408 | 500 | 984 | 1,060 | 904 | 940 |
| | Low | 390 | 437 | 408 | 400 | 984 | 956 | 834 | 902 |
| | Average | 465 | 478 | 408 | 438 | 984 | 1,004 | 838 | 917 |
| Sept. | High | 478 | 485 | 410 | 425 | 990 | 962 | 900 | 913 |
| | Low | 466 | 440 | 380 | 400 | 990 | 936 | 890 | 820 |
| | Average | 472 | 451 | 409 | 417 | 990 | 955 | 890 | 843 |
| Aug. | High | 493 | 450 | 418 | 395 | 990 | 943 | 900 | 791 |
| | Low | 450 | 430 | 378 | 325 | 840 | 917 | 893 | 785 |
| | Average | 472 | 438 | 397 | 385 | 948 | 933 | 897 | 787 |

1/Gilled and gutted.

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Japan (Contd.):

## SAURY CATCH DECLINED IN 1967

The 1967 Japanese saury fishery ended another poor season. The catch was 215,000 metric tons, only slightly above 1964's low of 200,000 tons. Since 1964, landings have been consistently low, running not much above 200,000 tons, or less than half the peak production of the past.

The poor season was ascribed to rough sea conditions in October and November 1967. Also, dense schools were absent in the early phase of the fishery. Because fish size was small, only 10 percent of the catch was sold for fresh consumption; 70 percent was frozen and 10 percent each canned and processed into fish meal.

### Fishermen Worried

Fishermen are becoming increasingly concerned over the declining abundance of saury and growing Soviet operations off Japan. They are urging thorough investigation of the resource. However, they do not claim Soviet operations have caused a sharp decline in abundance. They are opposed to an all-out fishing regulation for this reason: should the fishery come under international regulation, the Japanese themselves also would be subject to treaty restrictions. ("Minato Shimbun," Jan. 11, 1968.)

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## CUTS FROZEN SWORDFISH EXPORTS TO U. S. IN FY 1968

In early January 1968, the Japan Frozen Foods Exporters Association adopted a 4,500-short-ton quota of frozen swordfish exports to the U. S. for FY 1968 (April 1968-March 1969). This is a decrease of 1,000 tons from the FY 1967 quota. It was made because of the poor export performance last year. ("Katsuo-maguro Tsushin," Jan. 17, 1968.)

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## TUNA SEINER IN EASTERN ATLANTIC

The 500-gross-ton Japanese purse seiner "Hakuryu Maru No. 55," departed for the West African tuna fishing grounds on Jan. 8, 1968. It was scheduled to pass through the Panama Canal around Feb. 3, en route to the eastern Atlantic Ocean to join the Nichiro Fishing Co.'s two-boat-type purse-seine fleet in the Gulf of Guinea.

### First 1-Boat Seiner in Guinea Gulf

Since the "Hakuryu Maru" will be the first Japanese one-boat seiner to operate in that area, its performance will be watched by the home industry. Later, another 500-ton one-boat purse-seiner, now being built, is scheduled to join the fleet. ("Shin Suisan Shimbun Sokuho," Jan. 19, 1968.)

Note: An earlier report said the vessel departed Japan in mid-December 1967 and would fish off California, Mexico, and Central America until about June 1968 before joining the eastern Atlantic fishery.

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## ATLANTIC TUNA EXPORT PRICES UNCHANGED

Japanese Atlantic tuna transshipments to the U. S. and Italy have remained relatively unchanged since late October 1967. Export prices for shipments, as of Dec. 30, 1967, were: U. S.: round albacore, f.o.b. $450 a short ton; yellowfin (gilled & gutted) f.o.b. $390 a short ton. Italy: yellowfin (gilled & gutted) c.i.f.c. (c.i.f. plus commission) $520 a metric ton; yellowfin (dressed without head and tail) c.i.f.c. $550 a ton; big-eyed (dressed) c.i.f.c. $365 a ton.

### Foresee Steady Prices

The Japanese foresee no price increase for tuna transshipments to the U. S. because U. S. packers are not buying tuna from Japan at this time. This is because of the unclear outlook for 1968's local U. S. yellowfin and skipjack fisheries. Also, the U. S. packers have increased substantially tuna imports from South Korea and Formosa.

On the Italian market, indications are that prices may rise somewhat since canned tuna inventories at the packers' level are reported low, and the Italian packers again are showing buying interest in Japanese tuna. ("Katsuo-maguro Tsushin," Jan. 16, 1968.)

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Japan (Contd.):

## TUNA IMPORTS INCREASE SHARPLY

Japanese fresh and frozen tuna imports in 1967 were up 50 percent from 1966, according to the Japanese Customs Bureau. Tuna imports have risen sharply in the past two years: from around 2,500 tons in 1965 to 10,796 tons in 1966, and to 16,184 tons in 1967.

The growing tuna demand, coupled with leveling off of Japanese production, is expected to boost imports in the years ahead.

### Buys From Several Sources

In 1965, tuna were purchased mostly from Okinawan and South Korean vessels landing catches in Japanese ports. But, starting in 1967, purchases from South Korean and Taiwanese vessels operating in the Indian and Atlantic Oceans began to increase. Imports from those countries consist largely of bluefin and big-eyed--because the South Koreans and Taiwanese sell their albacore and yellowfin tuna catches primarily to the U. S. and Italy. ("Suisan Tsushin," Feb. 10, 1968.)

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## SHRIMP IMPORTS ROSE IN 1967

In 1967, Japanese frozen shrimp imports totaled 44,466 metric tons worth 28.7 billion yen (US$79.7 million) on a customs-clearance basis. This is an increase of 23 percent in volume and 33 percent in value over 1966 imports of 36,156 tons worth 21.6 billion yen ($60.1 million).

Shrimp Imports, 1964-67

| Principal Country of Origin | Value 1967 | Quantity Imported | | | |
|---|---|---|---|---|---|
| | | 1967 | 1966 | 1965 | 1964 |
| | US$1,000 | . . . . (Metric Tons) . . . . . | | | |
| Soviet Union. . . . | 10,314 | 9,836 | 6,518 | 1,632 | 54 |
| Mexico. . . . . . . | 19,440 | 7,995 | 4,889 | 5,210 | 4,663 |
| Thailand. . . . . . | 7,412 | 5,090 | 3,691 | 1,976 | 1,485 |
| Communist China . | 10,334 | 5,004 | 11,769 | 5,875 | 5,484 |
| Hong Kong. . . . . | 3,213 | 3,002 | 3,170 | 2,579 | 1,679 |
| India. . . . . . . . | 2,777 | 2,147 | 993 | 850 | 642 |
| South Korea . . . . | 4,614 | 1,401 | 847 | 1,003 | 1,030 |
| Australia. . . . . . | 2,592 | 966 | 685 | 563 | 694 |
| United States . . . | 1,916 | 754 | 230 | 17 | 192 |
| Others . . . . . . . | 17,131 | 8,271 | 3,364 | 1,306 | 1,164 |
| Total. . . . . . | 79,743 | 44,466 | 36,156 | 21,011 | 17,087 |

The number of countries exporting shrimp to Japan also jumped from 28 nations in 1966 to 56 in 1967. The Soviet Union's 9,836 tons made her the leading shrimp exporter to Japan in 1967. ("Suisan Tsushin," Feb. 9, 1968.)

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## SAFETY PRECAUTIONS TIGHTENED IN JAPAN SEA

The Japanese Government has advised all her fishing vessels in the Japan Sea to observe strictly the safe navigation rules in the Maritime Accident Prevention Law. The Government acted to ensure the safe operation of Japanese fishing vessels because tension has heightened there since North Korea's seizure of the U. S. naval vessel "Pueblo."

One crab fishing vessel reported gear loss caused by passage of a huge foreign naval ship. Some fishermen claim their vessels were surrounded by foreign patrol boats.

### Government Cautions Fishermen

Japanese fishing vessels in the Japan Sea (over 6,350 of them) have been cautioned to display the national flag clearly, refrain from approaching foreign military vessels operating in the area, and to stay away from South Korea's exclusive fishing zone.

The Government also has requested the U. S., the USSR, and South Korea to consider the safety of Japanese vessels fishing in the Japan Sea. ("Minato Shimbun," Feb. 10, 1968.)

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## PLANS LARGER TRAWLERS

Led by Nippon Suisan Kaisha, whose 3,910-ton "Niitaka Maru" left Japan Jan. 31 for Arctic waters, other large firms are moving up to 4,000-ton-class trawlers. The trend stems from dwindling local fishery revenues and the need to seek new distant-water grounds.

Besides the "Niitaka Maru," Nippon Suisan has completed another vessel of 3,950 tons, the "Fuji Maru." It plans 2 more trawlers of the 4,000-ton class this year.

### Other Companies' Plans

Other companies with similar plans include Taiyo Fishing Co., Hoko Fishing Co.,

Japan (Contd.):

and Kyokuyo Hogei. Cost of these 4,000-ton-class trawlers is about US$2.8 million each.

Even European fishing companies that made early advances into pelagic fishing still lack 4,000-ton trawlers.

All the latest large Japanese trawlers are equipped with cold storage and filleting and meal-processing facilities. ("Japan Economic Journal," Feb. 6, 1968.)

* * *

### TALKS ON AUSTRALIAN 12-MILE FISHERY ZONE END

The Japanese-Australian talks in Canberra concerning continuation of Japanese fishing inside Australia's 12-mile exclusive fishery zone ended on Feb. 9 without agreement. The talks, which began Jan. 30, are expected to resume in late April or early May 1968.

#### Interim Agreement

An interim agreement was reached permitting Japan to continue fishing in the contiguous zone, except in one specified area.

At present, about 200 Japanese long-liners are fishing off the coasts of Australia. In 1967, they took 4,500 metric tons of tuna, mostly bluefin and yellowfin. The Japanese are also fishing shrimp in the Gulf of Carpentaria. ("Suisan Tsushin," Feb. 12, 1968.)

## South Korea

### PLANS FOOD PROCESSING EXPANSION

A South Korean fishery and agricultural exhibit will be held at Seoul in June 1968, sponsored by the Government-backed Agriculture and Fishery Development Corporation (AFDC). The exhibit will encourage domestic investment in agriculture and fisheries. It will feature commercial gardening, food processing, and marketing technology. AFDC's goal is to create large food-processing complexes to expand domestic consumption and to export fishery and agricultural products.

#### Adviser Sought

The Government also seeks a food-processing adviser for AFDC. His major responsibility will be to establish basic policies for future operations by selecting products to produce and ways of marketing them. AFDC expects to obtain the adviser from the U. S. food industry for an initial 6-month period. (U. S. Embassy, Seoul, Dec. 29, 1967, and Jan. 24, 1968.)

* * *

### TUNA FLEETS TO FISH IN INDIAN OCEAN

Two South Korean tuna fleets departed for the Indian Ocean early in January 1968. Ten vessels will stop at Shimonoseki, Japan, to refuel and pick up supplies, gear, and bait. The first fleet, which consists of 4 boats each 348 gross tons, belongs to Ko Ryo Distant-water Fishing Co. of Seoul. The second fleet consists of 6 vessels, each 91 tons, and is owned by A Jin Fishing Co. of Pusan.

#### Japan Permits Entry

Entry of foreign fishing vessels into Japanese ports is restricted, but these S. Korean fleets were permitted entry because they did not intend to fish off Japan.

The first fleet will operate out of Durban, South Africa, and second will be based at Penang, Malaysia. They were scheduled to begin fishing in mid-February 1968. ("Nihon Suisan Shimbun," Jan. 15, 1968.)

## Taiwan

### EXPANSION OF FISHERIES PLANNED

Taiwan has programed a 5-year fishery development plan to increase the catch from 497,000 metric tons in 1967 to 800,000 tons by 1972. A budget of NT$5.9 billion (US$146.2 million) will cover construction of tuna and other fishing vessels to more than double the existing tonnage of 142,000 gross tons.

An additional NT$5 million (US$125,000) will be loaned by the Joint U. S.-Taiwan Commission on Rural Reconstruction to marine processing plants. The loan will help plants improve the quality of marine products and so increase exports.

Taiwan (Contd.):

Technical Assistance

Also, the Joint Commission will provide technical assistance to the Provincial Marine Research Institute's 2-year study of fish culture and fish-processing techniques. The study is supported by a 1966 grant of US$150,000 from the Rockefeller Foundation. ("Taiwan Industrial Panorama.")

## Malaysia

SHRIMP INDUSTRY EXPANDS IN NORTH BORNEO

Shrimp fishing for export is a fast-growing industry in the Brunei and Sabah regions of Malaysia. Two hundred trawlers operate year-round from the port of Sandakan to supply 2 freezing plants. Two more plants are planned.

Sabah Fishing and Industrial Co., Ltd. (SFIC) pioneered the export of frozen shrimp from Sandakan and currently purchases the catch of 75 trawlers. U.S. Federal standards are used as a guide during all phases of processing because most shrimp exports go to the U. S. Japan shares the largest remaining portion of the shrimp exports; markets in Scandinavia and South America also have been established.

Concern About Overfishing

Officials of SFIC, fearing shrimp stocks may become overfished, have suggested closed seasons. The Malaysia Government will carry out a survey early in 1968 to assess the condition of commercially important marine species, including shrimp. ("Daily Star," Dec. 12, 1967; "Borneo Bulletin," Dec. 16, 1967.)

# SOUTH PACIFIC

## Tahiti

REPORT ON SKIPJACK FISHERY

Ninety diesel-powered vessels (30 to 38 feet long and 70 to 160 hp.) are now fishing skipjack tuna with pole and line, without bait, from the port of Papeete in Tahiti. Each boat carries 2 or 3 men. Also, the same type of 3-man vessel is now operating in the long-line fishery. The fish are brought to market in Papeete and sold as fresh fish. One wooden Hawaiian sampan-type boat is now being constructed at the Papeete shipyard and is expected to be ready in March 1968.

Annual Catches

The annual catch of skipjack was about 730 metric tons in 1966 and 530 metric tons in 1967. These landings represent 43 percent and 29 percent of the total catch of fish (1,700 metric tons in 1966 and 1,850 metric tons in 1967). The total catch consisted of yellowfin tuna, big-eyed tuna, albacore, akule, reef fish, and skipjack tuna. There are some seasonal fluctuations in landings of skipjack tuna and other species.

Catch Below Demand

The present catch seems to be far below the demand. The population has grown rapidly from about 50,000 in 1962 through immigration from the French mainland, Algeria, and other French territories.

Fishing gear and techniques used are similar to those of the Hawaiian pole-and-line skipjack fishery. An exception in the use of artificial lures made of local "mother" or "half-pearl" shells. As soon as boated, tuna are killed by hitting the head with a wooden bar. Then they are eviscerated.

# AFRICA

## South Africa

### DEVALUATION IS NOT EXPECTED TO HARM FISH MARKET

Great Britain's devaluation of the pound sterling should have virtually no effect on sales of South African canned fish, fish meal, or fish oil to that market, said the chairman of Federal Marine Ltd. The latter is the marketing company for the South African Inshore Fishing Industry. Because of its reasonable price and high protein value, canned pilchards as food could not be replaced on the British market. Therefore, its sales would not be affected by devaluation.

The fish meal and fish oil market depended entirely on Peru and would not be affected by devaluation.

Britain is one of the main buyers of canned fish and fish meal produced in South and South-West Africa. She takes the entire fish oil production. ("The South African Shipping News and Fishing Industry Review," Dec. 1967.)

* * *

### SOUTH AFRICAN HAKE SHOULD BE FROZEN AT SEA, U. K. REPORT SAYS

The latest annual report of Great Britain's Torry Research Station, covering work in 1966, includes the results of studies on the most suitable ways of processing Cape hake for the British market.

The report states: "The notorious softness of hake, as it is currently processed, often leads to unacceptable amounts of breakup, and so means of improving the appearance of such broken fillets with polyphosphate and brine dips were also looked into. These experiments appeared to be fairly successful although their products aroused a certain amount of controversy."

#### Rapid Chilling, Adequate Bleeding

Torry affirmed the importance of rapid chilling and adequate bleeding of the catch before freezing at sea, either as fillets or whole fish. The eating quality of hake frozen at sea has been shown superior in most cases to the more usual product frozen on shore after chilling at sea. Torry believes "an improvement can be made on the quality of hake currently being imported from the southeast Atlantic."

#### U. K. Market Less Favorable

Under pressure of price-slashed exports from other producers, South African frozen fillets have not been doing as well in the United Kingdom as in 1966.

Imports for the first 9 months of 1967 show an increase of nearly 70,000 cwt. in fillets from all areas--from 509,470 cwt. to 578,336 cwt. But the total paid dropped from about US$17.2 million to $17.1 million. From 55,007 cwt. in the 9-month period in 1966, South Africa's share fell to 51,416 cwt; this earned $1.1 million, compared with $1.2 million.

Whole frozen hake, however, continues upward in Britain. Sales in 9 months of 58,064 cwt., worth $954,000, exceeded the 1966 total. They were far above the 39,356 cwt. and $708,000 of the first 9 months of 1966. ("The South African Shipping News and Fishing Industry Review," Dec. 1967.)

* * *

### WILL SUBSIDIZE BUILDING FISHING VESSELS OVER 500 TONS

The South African Minister of Economic Affairs announced, at a new shipyard's opening in Durban in November 1967, that fishing vessels of 500 gross tons and over would qualify for the Government's shipbuilding subsidy. The minister stated that this assistance was very substantial; in fact, it exceeded that given to any comparable secondary industry. As shipbuilding continued to develop, both in Durban and Cape Town, he foresaw that the Government's financial burden would become considerable.

#### Government Aid Will Lessen

The assistance had been designed to put shipbuilding on its feet as rapidly as possible. The Government was determined to reduce its help as soon as possible. For this reason, the minister said, industry progress would be carefully watched. The Government intended to develop Rietvlei in Table Bay as a modern fish harbor--and provide for the development of a large shipbuilding industry.

#### Government Aid Welcomed

The chairman of the shipyard corporation said of the aid: "It is welcomed by us, and I

Africa (Contd.):

am sure, by the fishing fraternity.... It will, without doubt, assist them greatly in their fight to compete with the big overseas trawlers which are invading our traditional fishing waters in ever increasing numbers." ("The South African Shipping News and Fishing Industry Review," Dec. 1967.)

## Spanish Sahara

JAPANESE TRAWLER SEIZED OFF SPANISH SAHARA

The Japanese trawler "Inase Maru No. 1" (300 gross tons) was seized off the coast of Spanish Sahara by the Spanish Navy on Dec. 27, 1967. The captain was charged with violating Spain's 12-mile exclusive fishery zone. This is Spain's first seizure of a Japanese vessel involving violation of the 12-mile zone.

The Japanese report that the trawler was seized 12.3 nautical miles off the territorial coast. The vessel was escorted to Las Palmas, where her catch of about 7 tons of "Monko" squid and other fish were confiscated. Also, she will be fined anywhere between US$850 and $8,500. ("Suisancho Nippo," Jan. 6, 1968.)

## Cameroon

NEW U. S.-CAMEROON SHRIMP FISHING VENTURE

In late 1967, the Government of Cameroon granted significant concessions on taxes and import duties to a new shrimping company--Crevettes du Cameroun. Now the firm has only to find a suitable site on the Douala waterfront to begin operations.

The firm is a joint venture of the subsidiary of a U. S. seafood company and the Cameroonian fishing firm SOPECOBA. It is being established with initial capital of US$700,000: the U. S. firm 50 percent, Cameroon 15 percent, and the remainder from SOPECOBA and its shareholders.

SOPECOBA Pioneered

SOPECOBA was established at Douala in November 1952 with $152,000. It pioneered industrial fishing and now operates 4 trawlers. Its annual production of fresh fish is 4,500 metric tons. As of June 30, 1966, its investment had grown to $563,000.

Crevettes' Operations

Crevettes du Cameroun will catch, process, and freeze shrimp for export, almost all to the U. S. Eight specially equipped steel trawlers will fish for the 2 varieties of shrimp most common to the Gulf of Guinea: the Penaeus duorarum and the Penaeus aztecus (brown shrimp).

Seven of the trawlers are 70 feet long and will be able to remain at sea up to 20 days. The eighth will be larger and capable of more extensive operations.

Shore installations will comprise harbor facilities for the trawler fleet and a modern plant to sort, clean, freeze, and pack up to 4 metric tons of shrimp per day, in 5-lb. cartons. The plant also will be capable of producing 40 metric tons of ice per day.

The Operating Plan

To operate profitably, the firm sees a minimum annual production of 680 metric tons, or 300,000 5-lb. cartons. This will require landing 750 metric tons (8.5 tons per boat per month for 11 months of the year). The company will employ 88 persons (41 on vessels, 47 on shore). At the outset, the trawler captains will be Latin Americans with long experience in shrimp fishing. However, they also will train Cameroonian fishermen. The vessels will have Cameroonian registry.

Operations are scheduled to begin in August. The new enterprise unquestionably represents an investment favorable to that country's economic development. Beside the influx of foreign capital and the employment and training provided, its 8 vessels will increase by 50 percent the size of the commercial fishing fleet (15 vessels now).

The shrimp exports will earn about US$1 million a year in foreign exchange, and an estimated $32,000 in revenues from export taxes. (U. S. Embassy, Yaounde, Feb. 6, 1968.)

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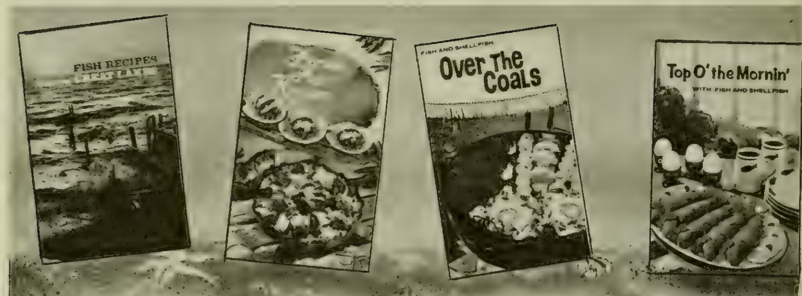


### FISH RECIPES FROM THE GREAT LAKES

The Great Lakes—waterway to the Heart of America—have spawned some of the tastiest fish that ever nourished and pleased mankind. From their cold depths have come whitefish, king of fresh-water fish; lake trout, regal ambassador of rich taste; yellow perch, delicate fillets unsurpassed in flavor; and smelt, silvery slips in the water and savory slivers on a platter. In **Fish Recipes from the Great Lakes,** the Bureau of Commercial Fisheries has created a boatload of 24 imaginative recipes with full-color photographs showing plate arrangements, garnishes, and "go-withs". So ride a wave of flavor onto your dinner table with fish from the Great Lakes.

### FLORIDA FISH RECIPES

Every time King Neptune dips into his seafood Horn of Plenty, he comes up with something good to eat from the bountiful waters off Florida's coast; for here the rich harvest yields over 50 varieties of commercial seafoods, more than in any other area of the country. This tantalizing array of the sea's living treasure chest brings the King back time and again. It will bring you back just as often, once you have sampled the dinner delights from this wide array of seafood. Don't get hooked on just one kind of seafood. Try everything from this nautical richness! The Bureau of Commercial Fisheries gives you an exciting introduction through **Florida Fish Recipes,** a 16-page "seaquarium" of 22 fresh recipes. Full-color printing makes the best of seafoods look even better.

### FISH AND SHELLFISH OVER THE COALS

Here's an attractive seafood outdoor-cookery book that will put you right into the swim of things as a backyard chef and make you the big fish in any size pond. **Fish and Shellfish Over the Coals,** a 24-page appetite builder from the Bureau of Commercial Fisheries, tells you everything about grilling seafood except how to make the catch. It explains the many cuts and forms of fresh and frozen fish and tells you how to recognize good fish and how much to buy. It also gives easy-to-follow directions for starting a grill fire. Printed in full color, the pictures and 36 recipes are so appetizing you can almost smell the rich, "outdoorsy" aroma of grilling seafood.

### TOP O' THE MORNIN' WITH FISH AND SHELLFISH

Rarin' to go! That's what you'll be after a hearty breakfast with fish or shellfish. Such a meal may seem unusual; but in this day of individualism, the unusual and exciting are to be searched out and enjoyed. There isn't a more enjoyable way to break a tired breakfast routine than with fish or shellfish. Your family will change those dreary, every - morning yawns to wide-eyed looks of pleasure when you serve seafood for breakfast. The Bureau of Commercial Fisheries wishes you **Top O' the Mornin' with Fish and Shellfish** with this 20-page booklet of tempting full-color photographs and 21 unique, flavorful, breakfast recipes designed to chase the last sleep from your drowsy taste buds.

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### 'CAN-VENIENT' WAYS WITH SHRIMP

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### FANCY CATFISH

New Orleans Catfish . . . Cajun Catfish . . . Catfish Gumbo . . . recipes for the fish that polished up plantation parties, provided proteins for hardworking pioneers, and pleased palates all along the old river highways of Middle America's past and present. Catfish . . . the name itself brings daydreams of Huck Finn, lazy summer days, and riverbank adventure, in addition to meal after meal of delightful, tasty eating. The Bureau of Commercial Fisheries has hooked 18 kitchen-tested recipes in **Fancy Catfish** and given them a fresh look for today's modern meal planning. They are presented in this 20 - page booklet, rich with how-to-serve pictures, all in mouth-watering color.

### TAKE A CAN OF SALMON

**Take a Can of Salmon** . . . and you're on the right track for a healthful, hearty meal. Rich, tasty salmon is equally at home in a savory salad, souffle, sandwich spread, burger, mousse, chowder, or appetizer. Its versatility lets you test your originality too, starring in everything from basic casseroles to elegant main entrees. Salmon is one of the "complete protein" foods; it has the proteins you need every day for good health. Calorie conscious? Salmon has only about 150 calories per four-ounce serving. The Bureau of Commercial Fisheries suggests you take a can of salmon and get a head start toward flavorful, mealtime magic.

### SHRIMP TIPS FROM NEW ORLEANS

Open the cover of **Shrimp Tips from New Orleans** and the fragrant aroma of some of the most elegant shrimp dishes in America drifts up from its pages. Shrimp and the many fine cooks in New Orleans have had a long, distinguished love affair, resulting in a tradition of spicy, flavorful recipes with world - famous names — Creole, Gumbo, and Jambalaya. Now the elegance of these specialties can be created right in your own kitchen; and you can transform any meal into a candlelight dinner in posh old New Orleans. The 17 recipes and how-to-serve, full-color photographs in this Bureau of Commercial Fisheries booklet will make you a shrimp devotee for life.

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Recipe Publications pp. 76-78

# COMMERCIAL FISHERIES Review

VOL. 30, NO. 4



APRIL 1968

COVER: Fishermen hold fast to net and scoop ("scup") most of fish with smaller net guided by huge handle.

# COMMERCIAL FISHERIES
## Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

Fishermen's Memorial
Gloucester, Mass.

Managing Editor: Edward Edelsberg

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and Associate Editor: Jean Zalevsky

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and Mary Andrews

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

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# CONTENTS

Dumping catch aboard BCF's research vessel "Oregon" off Florida's east coast. (Photo: J. B. Rivers)

# PRESIDENT ASKS $516 MILLION FOR MARINE SCIENCE AFFAIRS IN FISCAL 1969

President Johnson asked Congress in March for $516 million in fiscal year 1969 (July 1, 1968-June 30, 1969) to pay for marine science affairs. This is 15 percent above the FY 1968 figure.

The President transmitted to Congress the recommendations in the second annual report of the National Council on Marine Resources and Engineering Development (better known as Marine Science Council). The Council is a Cabinet-level advisory group headed by Vice President Humphrey.

Fig. 1 - FPC.

The Vice President said of the report, "Marine Science Affairs--A Year of Plans and Progress": It is "an account of policies, programs, and accomplishments of the Federal Government for utilizing the oceans more effectively in meeting goals and aspirations of our Nation."

The President stated that the additional money is needed to:

Speed research to make fish protein concentrate (FPC) available in the War on Hunger.

Fig. 2 - BCF expert W. R. Heard explains how SCUBA is applied to fishery research. (Dr. D. Hoopes)

Broaden education and research in marine sciences, particularly in Sea Grant and other university programs. (See "Manpower Is 'Vital Ingredient' of Marine Sciences, Says Wenk," CFR Feb. 1968.)

Fig. 3 - Nomad (Navy Oceanographic Meteorological Automatic Device) buoy transmits data up to 2,000 miles over standard 100 words-per-minute radioteletype circuits. (U. S. Navy)

Develop improved ocean buoys to collect accurate and timely data for better prediction of weather and ocean conditions.

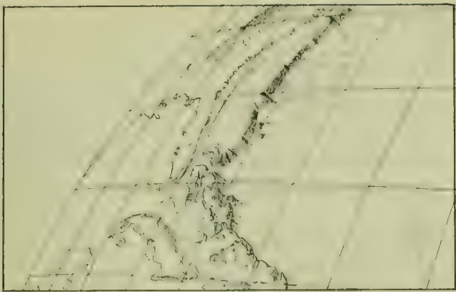


Fig. 4

Continue mapping Continental Shelf to aid resource development--"and other industrial, scientific, and national security purposes."

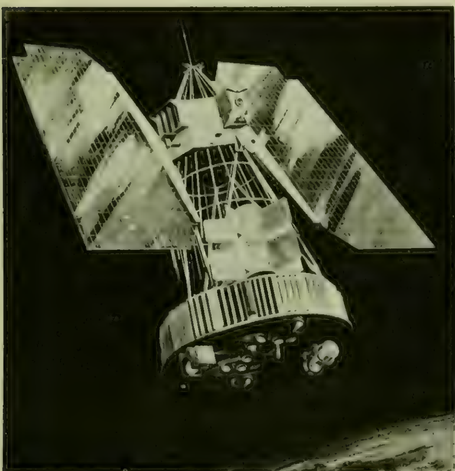


Fig. 5 - Nimbus weather satellite (NASA).

Apply space craft technology to oceanography--and improve observation and prediction of ocean environment.


Fig. 6

Increase research and planning to improve U. S. Coastal Zone and to promote development of Great Lakes, ports, harbors.

Fig. 7 - Oil covers Yorktown, Va., public beach after 1967 spill. (Virginia Institute of Marine Science)

Prevent or lessen pollution from oil spillage and other hazardous ship cargoes.

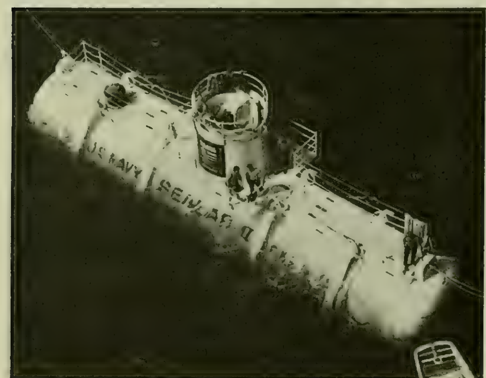


Fig. 8 - Navy's Sealab II. (U. S. Navy)

Expand Navy's advanced technology for work in deep oceans--"and for rescue, search and salvage."

Fig. 9 - The 310-foot, 8,449-ton, 21,000-horsepower U. S. Coast Guard "Glacier," America's largest icebreaker, opens a channel in the Antarctic's McMurdo Sound. The vessel now is engaged in a 2-year international oceanographic study of the Weddell Sea. (R. F. Clayton)

Build very strong cutter for Ice Patrol and oceanographic research in Arctic and sub-polar areas.

# REPORT ON FY 1968 ACTIVITIES

In 1967, President Johnson selected 9 priority areas of marine science recommended by the Marine Sciences Council for support during FY 1968. The following is a progress report on these 9 areas:

1. International Cooperation

- The U. S. proposed to the U.N. General Assembly that it create a Committee on the Oceans to promote international cooperation. The committee should work for an international legal structure to aid exploration and use of the seabed.

- Marine science cooperation was emphasized during the Latin American Summit Meeting at Punta del Este and in the communiqué following Japanese Premier Sato's U. S. visit.

- The U. S. and other nations persuaded the International Telecommunication Union to reserve certain radio frequencies for transmitting oceanographic data.

- "Plans were developed to propose establishment of international marine preserves."

- 50 foreign scientists took part in "Oceanographer's" global scientific expedition.

- British, Australian, and Canadian divers began aquanaut training in the U. S. to prepare for SEALAB III in summer 1968.

- Red tape was cut in arranging visits by Soviet fishery research ships to U. S. ports for projects of mutual benefit.

- Legal studies were begun "to gain new insight" into international problems involved in developing marine resources.

- "Studies were completed of the marine science programs of other nations and of international organizations."

2. Food from the Sea

The program was designed to tap the sea's inexpensive protein to benefit the world's hungry millions, especially through FPC. The Agency for International Development (AID) is the lead agency for the program; BCF is developing the technology.

Last year--

- AID opened a new office which, after surveying many countries, selected Chile for pre-investment market surveys.

- FPC produced from hake was approved for people by the U. S. Food and Drug Administration (FDA).

- BCF planned to build a pilot plant in the Pacific Northwest to produce FPC.

3. Sea Grant Program

The National Sea Grant College and Program Act was passed. Its purposes: to speed training and education of specialists, especially ocean engineers and technicians; to advance applied research; to spread marine science information.

To carry out the program, the National Science Foundation set up an Office of Sea Grant Programs, issued guidelines for obtaining grants, and made its first awards.

4. Data Systems Study

The Council studied the needs of Government, private industry, and scientists for marine science and technology data.

5. Estuary Study

Programs were planned to use a new laboratory under the Corps of Engineers--"to study estuarine navigation, water quality, shore erosion, and the effects of pollution and natural influences on fish, shellfish, health, recreation, and beauty of the Chesapeake Bay."

6. Surveys of Mineral Resources

"The objective is to accelerate planning, surveys, and survey methodology related to marine minerals." In FY 1968, surveys were continued off the Atlantic and Northwest coasts. New mineral deposits off Alaska were outlined. The Council spon-

sored a study of the economic potential of minerals of the U. S. Continental Shelf and Slope.

7. Ocean Observation and Prediction

A stepped-up program in FY 1968 resulted in an experimental breaker and surf forecasting service for southern California beaches to protect coastal commercial fishermen and bathers; completed a study showing the technologic feasibility of ocean data buoys to monitor ocean and atmospheric processes; set up the Regional Center for Tropical Meteorology in the National Hurricane Center in Miami, Florida, and strengthened the center. Improved weather information will be provided to shore communities, industries, and marine operators in the Tropical Atlantic.

8. Deep Ocean Technology

The loss of the U.S.S. "Thresher" and of unarmed H bombs off Palomares, Spain, emphasized the need to have better "search and salvage systems in the deep ocean." The Navy speeded its Deep Submergence Systems Project.

9. Subpolar Oceanographic Research Vessel

A Coast Guard ship replacement for one on International Ice Patrol was to be designed to permit oceanographic research in subpolar regions. Congress did not vote funds and another request for the vessel is being made.

## BCF IN 1967

The U. S. seeks to help the domestic fishing industry improve its position in world production through scientific, technologic, and economic means. The U. S. also seeks to harvest the oceans' riches more fully to help feed the world's hungry millions. The Bureau of Commercial Fisheries (BCF) is the prime agency in these endeavors.

The money requested for the FY 1969 fishery development and seafood technology programs of BCF would continue these major programs:

1. Resource Development and Management

Its purposes are: "to gather data to predict abundance and distribution of fish stocks"; to learn how many fish of one species can be caught each year without endangering the population; to gather information needed for international negotiations on high-seas fishery resources.

During 1967, this program

- "improved prediction of abundance and distribution for skipjack, bluefin and albacore tuna in the Pacific, and groundfish and sea scallops in the North Atlantic." It developed a prediction model to obtain maximum yield from the Tortugas, Florida, pink shrimp fishery.
- began to assess brown shrimp in the Gulf of Mexico;
- developed lobster and menhaden tagging programs;
- developed sonar equipment for monitoring salmon migration in Alaska streams with State cooperation;
- continued pesticide monitoring along the estuaries of the East Coast and the Gulf of Mexico;
- completed 2 phases of the fishways at Willamette Falls in the Columbia River system;
- tested successfully the experimental drifting buoys designed to obtain ocean data up to 400 miles;
- developed spacecraft oceanography to analyze biologically important ocean conditions;
- coordinated large-scale international investigations of tuna in Eastern Tropical Pacific.

2. Processing and Marketing

Its research seeks to convert raw fish into marketable products. In 1967, this program did the following:

- helped to expand commercial use of Spanish mackerel, soft clams, mullet, and catfish;
- helped to develop East Coast markets for fish products from the Pacific Northwest.

It did this by bringing together processors, buyers, and airline representatives;

- won FDA approval for human consumption of FPC;
- gave technical assistance to AID in selecting countries for FPC programs;
- developed new fish products;
- developed irradiation techniques aboard ships to increase the shelf life of fresh fish.

3. Advanced Technology

It is designed to help industry find fish more quickly and catch them more efficiently through new "harvesting methods, fishing tactics, and locating techniques."

During 1967, the program

- developed methods to estimate size of surface fish schools by aerial photography;
- tested successfully a prototype electrical trawl to harvest Great Lakes alewives;
- developed mechanized seining and conveyer equipment to reduce time and labor in harvesting farm-pond fish;
- improved midwater trawls and precision depth telemetry system to harvest Pacific hake;
- introduced improved pot gear and bait to expand commercial fishing for crab off southeast Alaska.

4. Economic Research

This is conducted to improve economic efficiencies in commercial fishing industry--"management, harvesting, processing, transporting, and marketing."

During 1967, fishermen were advised in planning and forming cooperatives. The economic research programs at East Coast universities were coordinated.

COLD WATERS PASTURE RICH ALGAE FAUNA

Current studies by Dr. John S. Bunt, Institute of Marine Science, University of Miami, indicate that marine microalgae, a base of the ecological food chain, develop in Antarctic waters below the normally accepted limit of the light zone.

Adjacent waters of the Antarctic continent, during the summer, may be the world's richest area of marine life. Low temperature, which enables it to hold more dissolved oxygen and carbon dioxide than seas to the north, may be one reason for this abundance of life.

SCUBA divers at McMurdo Sound penetrated through 16 feet of ice to collect samples of microalgae and protozoa living in the frigid water. An analysis of these algae indicates that the annual primary production of the Antarctic waters may exceed 30 million tons of organic carbon. (Reprinted with permission from "Science News", weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

## Steelhead Eggs Are Fertilized With Frozen Sperm for First Time

A significant breakthrough has been achieved in the preservation of fish sperm in a living state, reported BCF's Regional Director in Seattle, Donald Johnson. A team of Oregon State University (OSU) scientists, working under BCF contract, in cooperation with the BCF Columbia Fisheries Program Office in Portland, has made the first successful attempt to fertilize salmonid eggs with cryo-preserved (refrigerated) spermatozoa.

They fertilized the eggs of steelhead trout with spermatozoa that had been frozen and refrigerated in liquid nitrogen for 14 and 28 days. These eggs developed into alevins--newly hatched fish still attached to the yolk mass--which appeared to be normal.

Important Advance

Dr. Fred C. Cleaver, director of the BCF Columbia Fisheries Program Office, said the development promises to facilitate more efficient fish cultural practices and enhance research into fishery genetics and disease control.

"We're at the point of improving fish stock that animal husbandry was 40 years ago," noted Dr. Cleaver, "and this new development moves us another notch ahead in our attempts to breed better, stronger fish." He pointed out that preservation of fish sperm for long periods would make it possible to retain the sperm for fertilization of eggs that ripen at a later time; also, sperm could be transported from one fish hatchery to another for more effective use.

For the past century, fishery scientists have attempted to preserve spermatozoa of fishes in a viable condition for extended periods of time. Except for some work with herring in 1953, these attempts either have failed or yielded inconclusive results.

Study Began in 1966

In 1966, BCF contracted with OSU to develop methodology for the cryo-preservation (refrigeration) of viable salmonid sperm. Three scientists from the university's Department of Fisheries and Wildlife, Howard F. Horton, James R. Graybill, and Arthur S. H. Wu, went to work on the project. Dr. Raymond C. Simon, professor of fisheries, conducted chromosome analysis and gave other assistance.

They developed a "Solution 48" composed of 7 components. They discovered that the best survival of viable sperm was obtained in samples frozen in this solution in combination with dimethyl sulfoxide (DMSO). Alevins were produced from eggs fertilized with this frozen sperm.

The scientists noted: "These alevins appeared to be as normal as young fish produced from unfrozen spermatozoa. The fertility rate was low (0 to 18 percent), but to our knowledge this is the first successful attempt to fertilize salmonid eggs with cryopreserved spermatozoa."

The OSU team said these findings "warrant further investigation." "We believe that the percent fertilization can be increased by placing the sperm with the eggs immediately after the semen is thawed." This hypothesis is expected to be tested.

Other Study Findings

The study team reached additional conclusions:

Undiluted semen can be transported in a styrofoam cooler for 3 hours without detectable loss of viability.

No differences were detected in the gross morphology (form and structure) of spermatozoa of coho salmon, chinook salmon, rainbow trout, and steelhead trout.

Spermatozoa in undiluted semen will remain viable for at least several days when refrigerated at four degrees centigrade.

The concentration of sperm in semen of coho salmon and rainbow trout is 2.3 to 230 times greater than that for most farm animals.

An extender should be developed which will maintain viable sperm in greatly diluted semen.

There is a direct relationship between concentration of additive in the extender and optimum rate of freezing semen samples.

## Interior Suggests Legislation to Control Oil Pollution

Interior Department has submitted to Congress proposed legislation to help control pollution of U. S. waters by oil spills and other hazardous substances. The measure is designed to carry out major recommendations made in "Oil Pollution--A Report to the President," prepared jointly by Interior and the Department of Transportation.

Main Provisions

The main provisions of the suggested legislation would:

- Prohibit oil discharge from a shore facility or a ship within 12 miles of shore. This would cover the 3-mile territorial and the 9-mile contiguous zones. The previous standards of liability were limited to "gross or willful negligence" and to the 3-mile limit.

- Hold responsible for cleaning up affected areas the discharger of oil, including ship and shore facility owners.

- Empower the U. S. to clean up oil spills whenever pollutor fails to act, but would required the pollutor to reimburse U. S. Present law limits owner's liability to ship's salvage value; the proposal will extend it to the full costs of cleanup.

- Protect against large and dangerous discharges of pollutants other than oil by requiring pollutor to do what U. S. considers necessary to remedy situation. If pollutor does not act, the U. S. will take the necessary steps and hold former liable for costs.

## Foreign Fishing Off U. S. Atlantic Coast Discussed

Representatives of commercial and sport fishing interests and Federal and state fisheries officials met at the State Department in Washington, D.C., on March 21 to discuss problems of foreign fishing off the Atlantic coast of the U.S. from Maine to Cape Hatteras.

Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State, said: "I called this meeting to discuss with fishing interests and state officials the growing problems in the area. After a review of the facts, we had a frank discussion of the problems and actions which might be taken to relieve the burdens facing our fishermen since foreign fleets started heavy fishing here about seven years ago. Recently, the problems have intensified and have expanded to new areas, bringing new segments of our public into contact with international fisheries problems."

Agencies Collaborate

Ambassador McKernan added that the meeting did not arrive at a firm course of action for the future, but the discussion of various possibilities was useful. "We did not expect this meeting to reach broad decisions," he said. "Ideas explored here will be studied and further refined in subsequent meetings, where more specific lines of action will be developed. The real purpose of this meeting was to establish a new era of collaboration among the Federal agencies concerned, the state governments, and the fishing interests concerned. The meeting succeeded very well in doing this, as I see it, and laid a good basis for future cooperation."

Many Participated

BCF, the U. S. Bureau of Sport Fisheries and Wildlife, the U. S. Coast Guard, and the Department of State participated. Officials from Maine, New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, Virginia, and North Carolina, also took part.

In addition to representatives of sport and commercial fishing interests, regional groups and national organizations had been invited. (U. S. Department of State, March 21, 1968.)

## 1968 Great Lakes Fish Stocking Underway

Great Lakes sport and commercial fishing is being revitalized this spring with salmon and trout plantings totaling nearly 8 million fish, reports the Great Lakes Commission. Of the 2 principal participants, Michigan is concentrating on salmon and Wisconsin on trout; Pennsylvania, Ohio, and New York are initiating their salmon programs.

Stocking lake trout in Lake Superior.

Some 4.1 million lake trout yearlings are being planted in the Great Lakes waters of five states by the U. S. Bureau of Sport Fisheries and Wildlife; Ontario is releasing 500,000 young trout along the northern shore of Lake Superior. Lake Superior is receiving 2,320,000 and L. Michigan 1,800,000. Last fall 263,000 fingerlings of the 1967-year class were planted in Lake Superior by Minnesota and Wisconsin.

Cohos

In Michigan, 1,850,000 coho fingerlings are being released in 18 streams; 10 tributaries of Lake Michigan will receive 1.1 million; 5 Lake Superior streams--350,000; and 3 tributaries of Lake Huron--400,000, the first sizeable planting for Lake Huron.

Wisconsin will plant 25,000 yearling cohos in a Kewaunnee County stream--and 200,000 will be stocked in Great Lakes tributaries in 1969. This year's emphasis is on trout. The state is releasing more than 200,000 lake trout in Lake Superior streams. Also, 180,000 other trout--rainbows, browns and brooks--will be stocked in Lakes Michigan and Superior.

Lake Erie

Cohos will be introduced into Lake Erie on a limited basis this year until the program is evaluated. Pennsylvania will release 87,000 fingerlings into tributaries west of Erie; Ohio will stock the Chagrin River with 25,000 coho smolt.

New York has placed 6,000 coho fingerlings in Cattaraugus Creek, west of Buffalo; 25,000 yearlings are scheduled for release in the Salmon River at the east end of Lake Ontario. New York's present supply of about 180,000 coho fry will go into Great Lakes streams in 1969.

Minnesota's Plans

Minnesota expects to release its first coho in Lake Superior in 1969: about 100,000 yearlings are scheduled for the French River at a site about 12 miles from Duluth. Minnesota now is constructing fishways on several North Shore rivers, primarily to enable rainbow trout (steelhead) to bypass falls on these streams. The work is being done under the Anadromous Fish Act; Federal funds pay for half the cost.

## Great Lakes Production 1967 and 1966

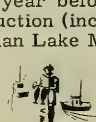
The following are preliminary Great Lakes catch statistics:

| State | Lake | Production 1967 | Production 1966 |
|---|---|---|---|
| | | . . (1,000 Pounds) . . | |
| New York | Erie | 254 | 220 |
| Pennsylvania | Erie | 478 | 573 |
| Ohio | Erie | 9,831 | 10,516 |
| Michigan | Erie | 1,052 | 1,389 |
| Michigan | Huron | 3,211 | 3,769 |
| Michigan | Michigan | 19,558 | 11,522 |
| Indiana | Michigan | 675 | 87 |
| Illinois | Michigan | 106 | 302 |
| Wisconsin | Michigan | 36,818 | 30,853 |
| Michigan | Superior | 3,991 | 4,604 |
| Wisconsin | Superior | 1,980 | 1,970 |

Lake Michigan Exceeds Erie

The total catch from Lake Michigan--57,157,000 pounds exceeded Lake Erie's 54,124,000 pounds for the first time since 1903. That year was the only time the total Lake Michigan catch exceeded the total Lake Erie catch. In 1903, the reported Canadian catch was low--and the cause may have been incomplete data.

For every year before and after 1903, Lake Erie production (including Canada) was much greater than Lake Michigan's.



# OCEANOGRAPHY

## Scripps' "Argo" Uses Computer and Satellites on Global Cruise

A sea-going computer and a satellite navigation system are being used by the research vessel Argo, which departed San Diego, Calif., March 7 on a year-long, 61,000-mile, scientific exploration. She will cruise the Pacific, Indian, and Atlantic Oceans for the Scripps Institution of Oceanography, University of California at San Diego. Dr. William A. Nierenberg, director of Scripps, described the cruise as "primarily a deep-sea, geological-geophysical exploration of the world ocean. . . .This expedition marks the first time that calculations of a ship's position at sea will be obtained automatically, using the vessel's speed and direction in conjunction with data received from the satellite, all being fed directly to the computer, to establish her position and thus improve the scientists' knowledge of the exact locations where data are being taken."

Dr. Robert L. Fisher, associate research geologist at Scripps, is in overall charge of the expedition called "Circe." Dr. Fisher said: "This computer will be used for geophysical and oceanographic data compilation and data reduction throughout the expedition. The satellite navigation system's shipboard receiver will be installed at Penang, Malaysia, about May 1, and will function during the remainder of the cruise. Rapid, frequent, precise fixing will permit on-the-spot revision and modification of investigations to take advantage, immediately, of knowledge just gained. Formerly, gaps or omissions--which can be easily remedied with the ship in the area--might not become apparent until months after a cruise was completed and the data analyzed."

The Computer

The IBM 1800 has a 32,000-word core storage capacity with a cycle time of two microseconds (millionths of a second). It is directly connected to the ship's scientific instruments and can gather information from them at up to 8 million bits a second.

The Satellites

The ship's navigator will be aided by 3 Navy satellites. The satellites will be orbiting roughly a north-south course 600 nautical miles above the earth every 80 minutes and transmit signals to the shipboard receiver. This system will enable the navigator to determine his position precisely in any weather even substantially better than a tenth of a mile. This is much more accurate than the conventional celestial "fix" or listening to land-based LORAN stations.

Dr. Fisher emphasized that such accuracy will be especially helpful in the Bay of Bengal, which is cloud-covered much of the time during the northeast monsoon season. Other electronic aids to navigation are not available there. Argo will be in the bay 6 of the 12 months.

What Scientists Seek

Expedition scientists will investigate "ocean bottom topography, magnetic patterns, heat flow, thickness of sediments in ocean basins and along continental shelves, distribution and types of hard rock, chemical properties of sediments and the water above them, and variations in the earth's magnetic field near the magnetic equator. Hydrographic casts will be made, bathythermographic observations collected, and biological tows completed."

The expedition's scientists and graduate students represent the U. S., Great Britain, Canada, Australia, Colombia, France, The Netherlands, and South Africa.

## Coast Guard Leads Data Buoy Development

The President's Council on Marine Resources and Engineering Development has assigned to the U. S. Coast Guard leadership of a development program for national data buoy systems. The development program begins on July 1.

The systems would contain unmanned automatic data buoys to provide marine meteorological and oceanographic data necessary for weather forecasting. These would also aid other Government-wide operations.

The program is based on a Coast Guard-managed study sponsored by several Federal agencies needing marine data.

The study concluded that the systems are the cheapest means of satisfying many Federal requirements for marine meteorological and oceanographic data. Also, the systems are attainable within 5 years.

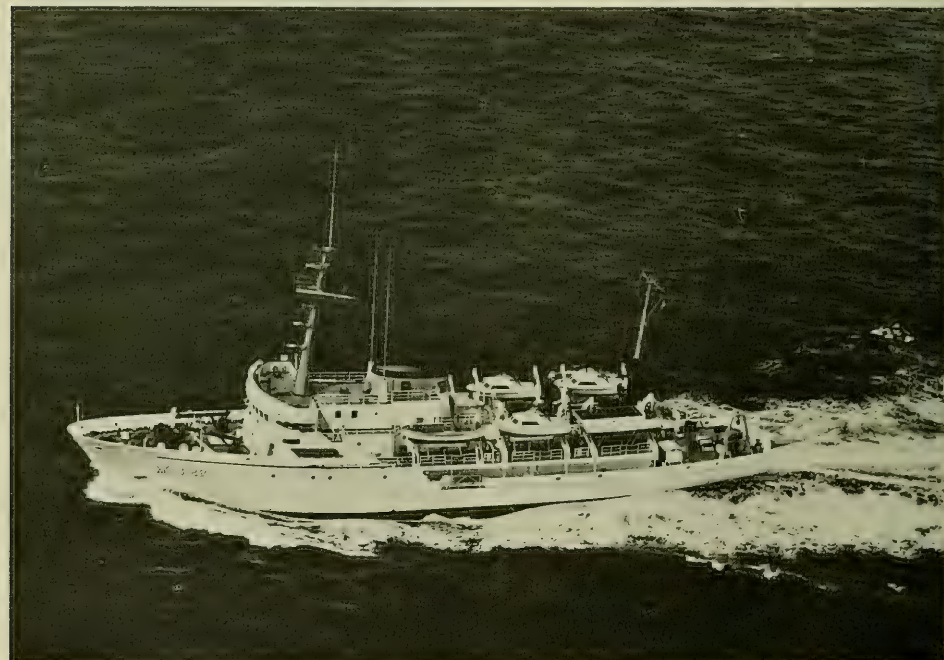
## New Hydrographic Survey Vessel Commissioned

A new U. S. hydrographic survey vessel equipped with electronic devices to probe America's coastal waters was commissioned by the Environmental Science Services Administration (ESSA) on March 23 at Jacksonville, Fla. She is the "Mt. Mitchell."

The Mt. Mitchell is the first of 3 sister ships built at Jacksonville to be commissioned for the ESSA fleet of ocean and hydrographic survey vessels. The others are the USC&GSS "Fairweather" and "Rainier." Two larger vessels were built in Jacksonville before the Mt. Mitchell: the USC&GSS "Oceanographer" and "Discoverer," for ocean surveys in the Pacific and Atlantic.

The $4.3 million, 231-foot, 1,660-ton, white-hulled Mt. Mitchell will take part in the U.S. Coast and Geodetic Survey's long-range program of marine charting and scientific exploration in the Atlantic.

The ship can cruise 8,000 miles and carry 79 officers, crew, and scientists. Her primary function will be to conduct hydrographic surveys in coastal waters in the Atlantic and the Gulf of Mexico. She also has some equipment for oceanographic surveying.



USC&GSS Mt. Mitchell. (Photo: ESSA)

# STATES

## Florida

MASS CULTURE OF PINK SHRIMP AND POMPANO STUDIED BY MIAMI U.

A $225,000 grant for a 2-year project to develop techniques for the mass culture of pink shrimp and pompano was awarded to the Institute of Marine Sciences (IMS), University of Miami (Fla.), by the National Science Foundation.

The aquiculture (sea farming) project is under Dr. Clarence P. Idyll. It will be conducted at the Florida Power and Light Co.'s Turkey Point plant. The purpose is to show that a predictable supply of high-quality pink shrimp and pompano can be mass produced in the shallow parts of the ocean at a predictable cost. The information and techniques learned will be passed on to commercial fishermen. The 2 highest-priced seafoods in the U. S. were chosen for study because of their value and the cost of aquiculture.

The Sea Grant Program requires that "matching" funds be provided by large industrial firms interested in diversifying their operations. Much money has been contributed to the project by Armour and Co. and the United Fruit Co. The Florida Power and Light Co. has made its property available and paid to build outdoor ponds.

IMS INTEREST IN SHRIMP

The Institute of Marine Sciences became interested in the commercial culture of pink shrimp in 1964, after 15 years of research on the Tortugas species. During that time, in the late 1950s, IMS biologists succeeded in raising shrimp from the egg to the young-adult stage in the laboratory. In 1965, Dr. Idyll went to Japan to study Dr. Motosaku Fujinaga's successful shrimp farm at Takamatsu. In summer 1967, Dr. Won Tack Yang, who will be involved in the shrimp experiments at Turkey Point, visited Japan to learn the latest developments in shrimp farming.

The shrimp research was scheduled to begin by stocking each of 4 $\frac{1}{4}$-acre ponds with 5,000 shrimp (about $2\frac{1}{2}$-inches long) in early March. These are the species of shrimp fished in the Tortugas. They should grow to $5\frac{1}{2}$ to 6 inches long after about 3 months in the Turkey Point ponds.

When a hatchery building is completed, egg-bearing female pink shrimp will be collected in the Tortugas and placed in indoor spawning tanks. The eggs will then be raised in the hatchery through the 11 larval stages and about 12 postlarval stages. The shrimp will still be less than $\frac{1}{2}$-inch long but can be put into outdoor growing ponds. There, experiments can be conducted on different kinds and quantity of foods, various water temperatures and salinities, and pond size in relation to shrimp size. Tests of food preferences of pink shrimp now are being carried out in the lab.

This project does not compete with shrimp fishermen. There probably will always be more shrimp produced in the areas where fished than is possible on a shallow-water farm; and aquiculture is not feasible in the open ocean.

Use of Warmed Water?

The scientists may learn if the heated effluent from the Turkey Point plant can be used. The plant uses sea water to cool its condensors, both in the fuel oil and nuclear facilities. When the cooling water is pumped out, it can reach about $10^{\circ}$ F. This heated water could benefit growing shrimp in the winter, when natural sea-water temperatures are low. This project may reveal if a nuclear plant pollutes Biscayne Bay.

Pompano Project

As the pompano project begins, the small pompano (1 to 2 inches long) will be caught in the surf along the upper East Coast of Florida. They will be raised in the Turkey Point ponds for about a year to reach marketable weight (about 1 pound). As more is learned about controlling the life cycle, the farming operations can be advanced to earlier stages. (Institute of Marine Sciences, U. of Miami, Feb. 22, 1968.)

## Oregon

FISH COMMISSION SEEKS TO ESTABLISH ABALONE

Two hundred adult red abalone from California were planted at Whale Cove, north of

Newport in Lincoln County, reports the Oregon Fish Commission. They supplement over 5,000 juvenile abalone planted there in summer 1967 as part of the Commission's effort to establish the species along the north coast.

The adult shellfish were gathered from the Fort Bragg area south of Eureka. They measured 5 to 9 inches across the shell; the largest weighed up to 4 pounds.

Seventy-five selected adults were retained in tanks at Newport. They are being conditioned for spawning attempt under laboratory conditions. If the experiment succeeds, as expected, it will give the commission a ready source of juvenile abalone for further stocking.

It is not known whether water temperatures in the natural environment at Whale Cove will become high enough for successful natural spawning. In southern California, where the abalone is an important sport and commercial species, spawning occurs at 62 to 64 degrees Farenheit. Oregon's coastal waters seldom get this warm for any appreciable period.

### Abalone Thriving in Whale Cove

The young abalone planted in Whale Cove in summer 1967 are doing extremely well, according to a Commission biologist. Most were planted when thumbnail size and have at least doubled in size. Whale Cove was selected as the first planting site on the north coast because brown algae, the primary item of the abalone diet, are abundant there. Also, limited access to the area and the interest of local residents and divers should protect the transplanted animals.

The red abalone occurs naturally on the coast of Coos and Curry Counties, as far north as Coos Bay.

## Texas

### EDA APPROVES FUNDS FOR BROWNSVILLE HARBOR EXPANSION

The Economic Development Administration (EDA) has approved $1,249,800 in grants and a $1,560,000 loan to help expand harbor and port facilities in the Brownsville area of Texas. The program is expected to create about 775 jobs in a 5-year period as the projects are built and begin operating.

The projects include the planned expansion of the fishing harbor. EDA approved a $720,000 grant for this. The applicant was the Brownsville Navigation District. A local investment of $480,000 will complete the total cost of $1,200,000. The project involves a new basin, improvement of docks and ramps, widening of a road, and installation of street lights, sewer lines, and a one-million gallon overhead water tank. The Navigation District estimated the project will increase the port's business by $30 million a year.

EDA is interested in increased capacity to process seafood products--and in the effect on the Gulf and overall market of increasing the supply of marketable seafoods.

* * *

### FY 1966-67 LANDINGS

32.3 million pounds of fish worth $1.7 million were taken from Texas bays and the Gulf of Mexico during fiscal year 1966-67, according to the Texas Parks and Wildlife Department.

* * *

### GALVESTON BAY YIELDS 6,000,000 POUNDS OF SEAFOOD

The total annual yield from Galveston Bay of commercial seafood products--such as shrimp, crabs, and fin fish--averages about 6,000,000 pounds. This was reported recently by J. R. Singleton, executive director of the Texas Parks and Wildlife Department.

A half-million pounds of oyster meat were taken from Galveston Bay in 1959. The figure increased to 4,000,000 pounds in 1966. (The 1967 season was still in progress.)

* * *

### BIG FISH IN BAYS ATTRACT ILLEGAL NETTERS

The bays of Texas, especially Lower Laguna Madre, "are full of big fish," and this has produced an increase in illegal netting. So stated Tom D. Moore, regional director of the Texas Parks and Wildlife Department, in mid-March.

Low-flying Department pilots reported seeing more big fish in the shallow waters of the Lower Laguna Madre, near Port Isabel and Port Mansfield, than ever before. Sportsfishermen and trotliners have been very successful, and illegal netters have got into the act.

Hurricane Beulah The Cause

The increase in numbers and size of fish in the bays commonly follows hurricanes, explains E. G. Simmons, the Department's regional coastal fisheries supervisor. He believes Hurricane Beulah in September 1967 was even more productive than most storms.

Since Beulah, more than 50,000 feet of illegal nets have been confiscated in Laguna Madre. "Many fishermen had been arrested and convictions obtained."

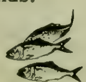
## North Carolina

1967 LANDINGS DOWN 10.5%

BCF figures show total North Carolina landings of shellfish and finfish for 1967 were 219,588,328 pounds worth $8,385,149. This was a 10.5 percent drop in weight and 12.1% decline in value from 1966 totals.

In 1966, total landings were 245,484,687 pounds worth $9,543,757.

The menhaden catch dropped most in 1967: 31,741,327 pounds fewer than 1966's 182,288,821 pounds.



## Alaska

SCALLOPS: TO SHUCK OR
NOT TO SHUCK ~ AT SEA

BCF Juneau reports that "aside from all of the recent excitement about 40,000-pound trips, 1,000 pounds per hour drags, and high $1.30 per pound product price, the paramount problem with Alaska scallops is to catch, process and market them at a profit."

The fishing industry and all others concerned are trying to decide between two alternatives: Should the Alaska scallop industry follow the method used by the East Coast scallop industry--shuck and freeze scallops aboard the vessel? Or, should Alaska scallops be landed alive and be shucked and processed in shore plants?

Fear East Coast Fishermen

Some Kodiak-based processors are thinking of legislation to require all portions of the scallops to be recovered by processors under the "wanton waste" clause. These processors fear that East Coast scallop vessels and fishermen will invade Alaskan waters, process the scallops on board, and market them in "stateside ports" without benefit to Alaskans.

BCF Juneau concludes: "Whatever the individual or community ideas may be, one fact remains: at present every pound of scallops processed is costing the processor money."

* * *

NEW SCALLOP FISHERY
DEVELOPS RAPIDLY

The new scallop fishery in Kodiak, Alaska, is growing fast. It now has 4 vessels. Two others--the halibut schooner "Seattle" of Ballard, Wash., and the scallop dragger "Viking Queen" of New Bedford, Mass.--were expected to start fishing soon. The latter will test fish scallop beds in the Gulf of Alaska with U. S. aid.

Record Catch

On a 1-week trip, the Alaskan king crab vessel "Virginia Santos" landed a record 10,000 pounds of scallop meats. This equals 110,000 pounds comparative shell weight. The Santos made the first commercial landing of scallops on Jan. 10, 1968--35,000 pounds, shell weight. The yield of meats to shell weight has been 9-10 percent; exvessel price 7 cents per pound, shell weight.

Possible Alternative to King Crab

Observers believe that it has yet to be demonstrated that Alaskan scallops can be caught, processed, and marketed at a satisfactory profit. Scallops offer a possible alternative to king crab. The 1967 catch of king crab dropped 24 million pounds from 1966's record catch.

The decline in king crab catch also has renewed interest in developing the latent tanner crab resource.

* * *

### MARINE SCIENCE COMPLEX PLANNED

Bills have been introduced into Alaska's House of Representatives and Senate for a $5 million bond issue to provide capital improvements for the "Trident Program." Conceived by Governor Hickel, the program would create a complex of marine research and educational facilities.

The program has 3 parts: the Alaska Institute for Fisheries Development, the Alaska Maritime Academy, and the Alaska Marine College, a sea-grant institution.

#### The Bond Issue

The sale of bonds would provide the money to pay part or all the cost of matching Federal and/or local funds that may become available to acquire, build, and equip the physical facilities.

## California

### BASKING SHARK FISHERY LAUNCHED

The basking shark fishery was launched Feb. 15 when 3 vessels caught six 25-foot sharks and a 15-foot juvenile at Morro Bay. This was reported by BCF Terminal Island, Calif. The average weight of the livers was about 1,000 pounds. The value of the livers depends on the amount of squalene in the oil.

The basking shark may reach 40 feet. It often can be seen at the surface basking in the sun and feeding on plankton.

Squalene is a hydrocarbon with very little nutritive value. When present in fish, it keeps away parasites. It gives a brilliant sheen to natural and artificial silks when used to finish them. Squalene also is used as lubricant, carrier of perfumes, and to fill thermometers.

#### Worth 20 Cents a Pound

At 35 percent squalene, the amount found in 3 sharks caught previously, the liver oil is worth 20 cents per pound. Oil samples were sent to prospective buyers in Japan and New York.

The fishery was expected to gain momentum in March when many basking sharks appear off the coast between Morro Bay and Santa Barbara.

* * *

### INTEREST IN DRIED SEAWEED INCREASES

A sharp increase in the world price of dried seaweed has renewed interest in it in California, reports the State's Resources Agency. The seaweed is not macrocystis, which has been harvested in quantity for many years. It is gelidium, less than 2 feet tall; other small feathery forms also are being considered.

For about 20 years, 2 men have harvested and dried seaweed near Cambria; each produces about 10,000 pounds of dried material.

In southern California, the seaweeds can be found in many places. Commercial interests have scouted the harvestable areas. The Fish and Game Commission is preparing regulations for the orderly use of seaweeds. Harvesting may be allowed by summer 1968.

#### Permit to Harvest Kelp

The Commission issued a 1-year permit to the A. B. S. Fishing Co. to harvest kelp with herring eggs attached from Tomales Bay and San Francisco Bay. The product is prepared by salting and refrigeration. It is exported to Japan, where it is sold as a table delicacy for $3 a pound. So far, the company has harvested 9 tons.

## Washington

### HAKE FISHERY CUT AS MARKET DEMAND DROPS

Landings of Pacific hake during the 1967/68 fall-winter season in Puget Sound, through February, were about $2\frac{3}{4}$ million pounds. For the same period during the 1966/67 season, landings were 6 million pounds. The decreased landings can be explained largely by the reduced market demand for hake.

#### $\frac{3}{4}$ of Landings at Everett

About 75 percent of the catch was landed at Everett, Wash., the remainder at Bellingham and La Conner, Wash.

If the hake fishery follows the pattern of 1965/66 and 1966/67, vessels will continue to fish hake in Puget Sound through May.

# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## 'Oregon II' Tests Sonar and Longlines on First Cruise

BCF's new exploratory fishing vessel, Oregon II, has completed Cruise 1. During Sept. 6, 1967-Feb. 9, 1968, she conducted a series of 8 performance trial trips in the Gulf of Mexico. Five trips were concerned with testing sonar equipment, and three with testing experimental bottom and surface longline gear.

### Fishing Gear

Bottom longline gear units consisted of 3 baskets of gear shackled together with a buoy and anchor attached to each end. One basket each of hook sizes 6, 7, and 9 (total 300 hooks) was fished at each station. A basket had 100 circle hooks on 6- to 12-inch monifilament gangions attached at 10-foot intervals to a $\frac{1}{4}$-inch nylon or polydactylene mainrope.

The swordfish longline gear used 5-fathom drops at each buoy. Buoys were placed 30 hooks apart; a small weight was placed every 15 hooks. Number 3 shark hooks on 2- to 3-fathom gangions were placed every 50 feet on the longline. The first set consisted of 210 hooks; later gear additions brought number of hooks per set to 530.

### Results of Bottom Longlining

36,100 bottom longline hooks, baited with squid and ladyfish, were fished at 119 stations in 20 to 300 fathoms during 44 days of fishing.

The most abundant foodfish by number and weight was the Atlantic tilefish, (Lopholatilus chamaeleonticeps); 322 weighing 1,928 pounds were caught at 48 stations. It was thought that this species did not occur in potentially commercial concentrations in the Gulf--but it was taken from all major Gulf areas sampled during Cruise 1. Tilefish were taken in 100-200 fathoms, although major concentrations were in 150- to 200-fathom depth range. Maximum tilefish catches of 285, 166, and 104 pounds per 300 hooks were made off Texas, the Campeche Bank, and in the northern Gulf, respectively. Size ranged from 1 to 27 pounds in weight; average was 6 pounds. The gray tilefish (Caulolatilus microps) was found in smaller numbers from 100 to 150 fathoms along eastern edge of Campeche Bank.

The yellowedge grouper (Epinephelus flavolimbatus) was the second most abundant foodfish taken: 113 fish weighing 1,168 pounds were caught at 21 stations. The depth range was 75-150 fathoms; greatest abundance occurred at 100 fathoms. A catch of 271 pounds on a 300-hook set off Texas was the highest. A 105-pound catch from Campeche Bank was the highest from other Gulf areas. Yellowedge grouper were not taken from Florida, and only 2 were caught in northern Gulf. Average weight was 10.5 pounds; size range was 4 to about 20 pounds.

Other foodfish taken in small quantities were: red snapper, vermilion snapper, wenchman, scamp, porgies, hake, and warsaw, red, and black grouper. Shark was the largest single bottomfish component; 561 sharks weighed 2,642 pounds, or 32 percent of total bottomfish catch. The bulk of shark total was taken from northern Gulf area and comprised mostly dogfish (Squalus) and smoothhounds (Mustelus), averaging about 3 pounds.

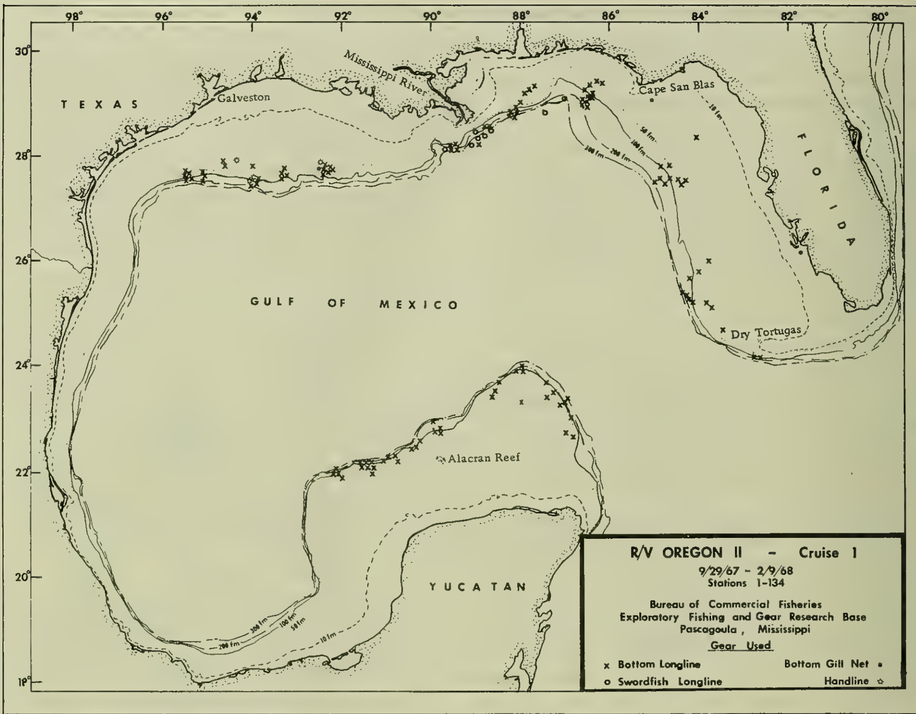
### Results of Surface Longlining

Swordfish longline sets--8 sets (3,308 hooks) baited with $\frac{1}{2}$- to 1-pound Spanish mackerel and mullet were fished from DeSoto Canyon to the Mississippi River Delta (longitudes 87°03' to 89°41' W.) and in 210 to 400 fathoms. Twenty-seven swordfish weighing 3,048 pounds and ranging from 19 to 270 pounds (113 pounds average) were caught. Swordfish were taken at each station, but best fishing was off Mississippi River in 330 to 350 fathoms; there 3 sets (1,260 hooks) produced 21 fish weighing 1,543 pounds. Only 2 fish, weighing 305 pounds, were caught in DeSoto Canyon area (448 hooks).

Sharks were predominant fish taken on each longline set--75 percent of total catch; 93 sharks weighed 9,545 pounds. Hammerhead sharks were most abundant, but silky and dusky sharks were also caught in moderate numbers. Other sharks were mako, tiger, and bignose. One 70-pound white marlin was taken off Mississippi River Delta.

### Sonar Used

Trips 1, 2, and 4 were in northern Gulf, and Trips 5 and 6 in eastern Gulf. During Trip 4, in October, numerous schools of surface




and subsurface herringlike fishes, including menhaden, were located by sonar in Cape San Blas-Cape St. George, Florida, area. Once, 105 surface schools were visually counted on surface within 5-mile radius of vessel. When sea surface became turbulent and schools sounded, they were detected by sonar in mid-water and near-bottom areas. Water depths ranged from 4 to 9 fathoms. Simultaneous aerial photographic and sonar detection were initiated during cruise.

Trips 5 and 6 concentrated in area from off Boca Grande to Fort Myers Beach, Florida, where commercial thread herring seiners were active. Minimum depth operational limitations of Oregon II (4 fathoms) restricted sonar operations in near-shore areas, where many commercial activities were centered. However, numerous large schools (over 50 tons) were detected in offshore areas. Thread herring concentrations were found as far as $8\frac{1}{2}$ miles offshore in depths to 7 fathoms.

Commercial vessels generally used aerial spotters. In some instances, water turbidity and lighting conditions were not favorable for reliable aerial detection--and sets were made solely on sonar information supplied by Oregon II. The value of sonar capabilities was clearly demonstrated to industry: the Oregon II returned to area in December after industry requested sonar assistance.

Coordinated Approach

Coordinated sonic fish-school measurements, aerial photography, and commercial vessel school samplings were made during November and December. Operational techniques and problems for this coordinated approach were studied and tested.

Additional coordinated resource assessment techniques are scheduled. Also planned during current fiscal year is design and development of a multisectional, narrow-beam, sonic device capable of making 2- or 3-dimensional measurements of pelagic fish schools. The long-range search and detection sonar is not suitable for these measurements, particularly in shallow water, because of its beam width (10°) and low frequency (20 KC).

During Trip 6, the sonar operation was demonstrated to industry members, 2 biologists from the St. Petersburg Biological Laboratory, and 3 members of another BCF program.

## 'Gilbert' Studies Thermocline West of Hawaii

The Charles H. Gilbert spent 4 days of its latest cruise determining the thermocline topography west of Hawaii (Cruise 107, Jan. 9-Feb. 24, 1968, Hawaii to Johnston Island).

Thirty-seven BT (bathythermograph) observations were made. Chart shows the thermocline topography measured.


Depth (meters) of the 20° isotherm during the first 4 days of Gilbert cruise 107.

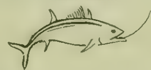
### Other Missions

The Gilbert had 2 other missions: (1) to determine the direction and speed of near-surface currents west of Hawaii and near Johnston Island, and the changes in current direction with time.

Thirty-four longline stations were occupied during the entire cruise. The drift of the longline gear during each station was used to determine the current.

The first 24 stations, off Kona, demonstrated the presence of a current flowing ESE toward the southern portions of the Kona Coast, and the presence of a cyclonic (counterclockwise) eddy in the northern half of the station pattern, as in chart. There is some indication of a 20-day periodicity in the speed and direction of flow south of the cyclonic eddy which might, upon further analysis, be evidence of periodic vortex shedding off South Point.

(2) To fish with longline gear, which is also used to determine currents. Also, to tag and release all tuna and billfish brought up alive and in good condition; the intent was to determine the changes in catch rate with time.



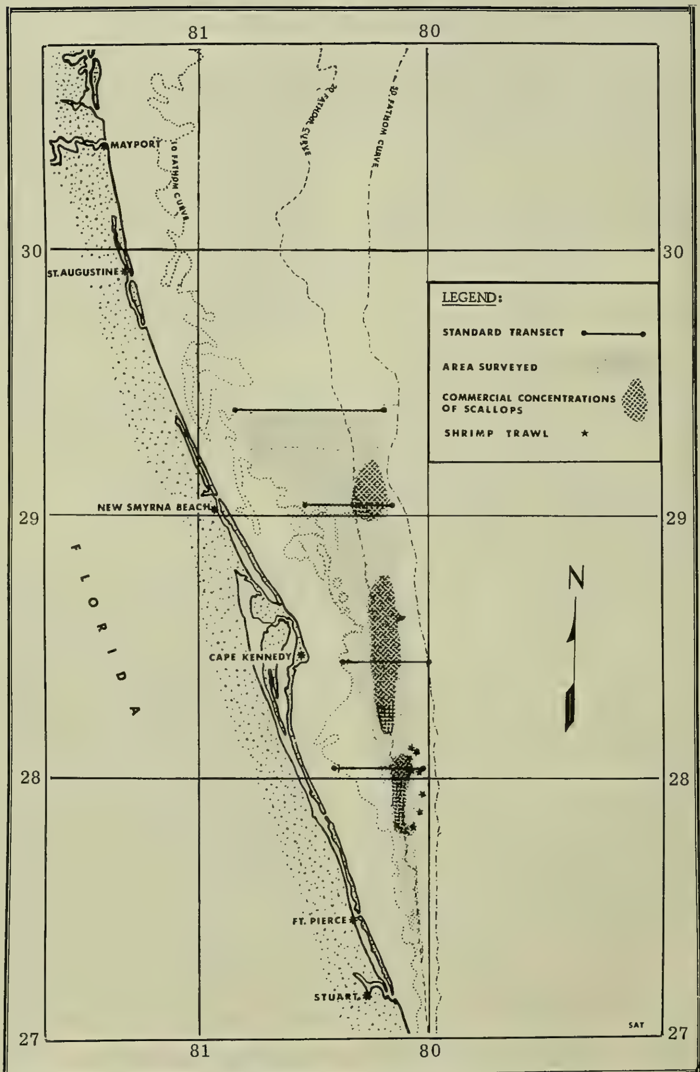
## Calico Scallops Still Plentiful Off E. Florida, 'Oregon' Finds

The R/V Oregon returned to St. Simons Island, Ga., on Feb. 29, 1968, after 17 days of scallop exploration off Florida's east coast (Cruise 126, 2/12-29/68; see chart p. 20). This was the fifth in a series of industrial development cruises to resurvey intensively the Cape Kennedy scallop beds. The purpose of the explorations is to maintain up-to-date assessments of the Florida east coast grounds. Previous explorations showed them to have the greatest potential for commercial use of calico scallops (Pecten gibbus).

Cruise 126's primary objective was to continue dredging emphasizing the areas north and south of Cape Kennedy, Fla. Four standard assessment transects were run along tracts established during September 1967 (Cruise No. 121). These transects have been occupied during each cruise in the series.

### How Oregon Operated

208 dredging stations were occupied in the 10- to 40-fathom depth range from east




R/V Oregon (Cruise 126).

of Jacksonville Beach to Stuart, Fla.; 197 stations were made with an 8-foot tumbler dredge fished with 2-inch bag rings, 20-rings deep; 11 stations were occupied with a 6-foot tumbler dredge fished with 2-inch bag rings, 13-rings deep. All dredges are fitted with $2\frac{1}{2}$-inch-stretched mesh nylon liners.

The Findings

East of New Smyrna Beach, where commercial concentrations were located in September, catch rates remained commercially significant; these ranged up to 23.7 bushels of scallops per 30-minute drag in the 23- to 31-fathom range. Counts ranged from 55 to 103 meats per pound.

East of Cape Kennedy (between latitudes 28°30' N. and 29°00' N.) catch rates were again commercially significant--ranging up to 29 bushels of scallops per 30-minute drag. Counts ranged from 68 to 144 meats per pound.

In the survey area's southern portion, from 28°00' N. to east of Stuart, catches up to 14.9 bushels of scallops per 30-minute drag and counts of 143 meats per pound showed areas of commercial significance.

A 1-day dredging demonstration was conducted for observers. Fishing information was relayed to vessels engaged in the scallop fishery.

Shrimp

Nine nighttime stations were occupied east of Melbourne, Fla., in 22-30 fathoms with a 65-foot, 4-seam flat trawl fished with a single warp and bridle arrangement on 8-foot chain doors. Catches of 15/20 count (heads off) brown and pink shrimp (Penaeus aztecus and P. duorarum) were small. They ranged up to 10 pounds per 2-hour drag.

## Modified Universal Trawl Tests Well

In early March, BCF's Seattle (Wash.) Exploratory Fishing and Gear Research Base cooperated with the commercial trawler "Junior" to demonstrate the effectiveness of a modified version of the Base-developed "universal" trawl.

The modified trawl is designed for midwater and ocean bottom use. It differs from earlier versions of the universal trawl used to harvest Pacific hake in having less webbing and larger mesh size in the wings--and so is easier to tow.

For 2 days, Junior fished alongside 3 other commercial trawlers and its catch was double any one of the 3. Six hauls by Junior caught 30,000 pounds of rockfish and 5,000 pounds of mixed flounders and Pacific cod.

Trawlers Plan To Use Trawl

Based on Junior's and similar earlier catches by BCF's "John N. Cobb," several captains of Pacific Northwest trawlers plan to build universal trawl nets from plans supplied by the Seattle Base.

## Report on Pacific Saury

The Pacific saury (Cololabis saira) is a common fish in the waters off California and is known to extend across the temperate zone of the northern Pacific. This species eats copepods, euphausiids, and anchovy larvae. It competes with adult anchovy and mackerel for food--and is an important forage fish for temperate tunas. Japanese, Soviet, and Korean fisheries have competed for saury in the western Pacific for the last few years. Soviet exploratory vessels have delimited the major concentrations of Pacific saury in the last 3 years and have begun experimental fisheries in the eastern Pacific off Oregon and northern California. Major commercial uses for this species are as fresh fish, canned, smoked, and dried for human consumption and as the preferred long-line bait for the Japanese tuna fleet.

Million Metric Tons

We compiled data in January 1968 from past California Current fish egg and larval surveys to estimate the stock size of sauries which spawn in the 300,000-square-mile area. There appears to be a 9-year average of 264,000 metric tons of adult Pacific saury spawning in this area in March, April, May, and June. It is apparent from the distribution of spawning that we have encompassed the southern boundary of spawning rather well, but we have not defined either the offshore or northern extent of the saury spawning grounds. Scanty data along the edge of our survey area would indicate that the

264,000 metric ton estimate may only represent $\frac{1}{3}$ to $\frac{1}{4}$ of the saury stock in the eastern Pacific. Thus it now seems likely that nearly a million metric tons of Pacific saury exist in this part of the Pacific Ocean. (Paul E. Smith, BCF Fishery Biologist, La Jolla, Calif.)

## Genetic Composition of South Pacific Skipjack Tuna Studied

The following was prepared by the BCF Biological Laboratory in Honolulu:

Kazuo Fujino, of our laboratory, spent 2 weeks fishing for tuna in Tahiti recently. His object was not food or sport, but to fill small plastic vials with blood drawn from the fish he caught. Dr. Fujino's specialty is the population genetics of marine animals, particularly the tunas, and blood samples afford the basic data he needs.

Tuna abound in Tahitian waters. Research cruises in the 1950s found many schools in the Society and nearby Marquesas Islands. The skipjack tuna (Katsuwonus pelamis) is particularly plentiful. It was the skipjack tuna that Dr. Fujino flew 2,500 miles to study, for one large gap in scientific knowledge of the skipjack tuna concerns the precise relation of these of the central South Pacific to those elsewhere.

Found in World's Warm Waters

Skipjack tunas are found in warm waters around the globe--in the Atlantic Ocean, the Indian Ocean, and the Pacific Ocean. Small but growing commercial fisheries exist in the Atlantic Ocean. Only a few of the fish are caught in the Indian Ocean at present. In the Pacific Ocean, the sea of tunas, in 1966, the Japanese took 224,000 metric tons (494 million pounds) in the waters near the home islands as far south as the Marianas. In the same year, the large U. S. fishery in the eastern Pacific caught 60,400 metric tons (133 million pounds) off Mexico and Central America. A third fishery, in the Hawaiian Islands, took 4.3 metric tons (9.4 million pounds). All these skipjack tuna were worth about $78 million to the fishermen.

And this large catch is far from reaching its peak, according to research of several scientific institutions, including ours. Scientists have estimated that the present yield of the central Pacific Ocean might be increased many times--with development of more effective methods of locating and taking the fish. Such an industry, based in Hawaii, would greatly strengthen the State's economy.

Problem of Conservation

Serious scientific problems attend bringing such a resource into production, however, and it was one of these that stimulated Dr. Fujino's trip to Tahiti.

History provides incontrovertible proof that man can wipe out wild species. The buffalo is a spectacular example; so is the largest of all living creatures, the blue whale. If the animal species of the sea are to be used wisely, they must not be harvested so heavily that they cannot reproduce themselves. In an elementary economy, the farmer saves seed grain, the rancher does not slaughter all his breeding animals; in the as yet primitive economy of the sea, which is based on hunting, a fishery might risk devastating a species, or all of a species in a certain area, if it is not carefully managed.

Therefore it is considered essential to understand the relation of the fishes in one area of the ocean to those in another. For example: Is there a single great skipjack tuna population in the Pacific Ocean? If catches were increased in the central Pacific, would enough of the stock be left elsewhere to replenish that area? Or are there several smaller populations, or subpopulations that do not interbreed?

Population Genetics Provides Leads

The discipline of population genetics provides some leads to answers; it depends upon the fact that certain characteristics are conveyed from one generation to the next, according to well-understood laws. In fishes, as in many other animals, some of these characteristics are blood types, and the presence of certain proteins in the serum.

Since it deals with populations, this branch of genetics requires many samples. The blood type of a single fish, or a few dozen fish, tells little or nothing about the whole population. But when hundreds of fish are sampled, then the population geneticist can draw conclusions about the population. The reason is that isolated subpopulations, groups

of fish that do not breed with fish from other groups, will display distinct proportions of blood types or other characteristics; these proportions change very, very slowly with the generations. So, in theory, if the fish from the eastern Pacific, say, never mingle with fish from off Japan to breed, then in time distinguishable subpopulations would be established.

In practical terms, this would also mean that if the population from off Japan, as an example, were brought to so low a level it could not reproduce itself, the area would not be repopulated by fish from the eastern Pacific--for they never would reach Japan. If, on the other hand, a single, great, freely intermingling population exists, the depletion of fish in any single area likely would be followed in time by replenishment.

Blood Center Established

To throw light on the subpopulation structure of the tunas, our laboratory has established a Tuna Blood Group Center. Samples come to it from all over the world. In recent months, shipments of skipjack tuna blood, for example, have been received from the Gulf of Guinea (off west Africa), and from the Trust Territory of the Pacific Islands in the western Pacific. And Dr. Fujino journeyed to Tahiti to obtain samples.

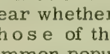
In all, 14,000 samples of tuna blood have been analyzed or are awaiting analysis at the Center. Because the species is important to the future of tuna fisheries in the central Pacific, more samples (12,000) of skipjack tuna blood have been taken than of any other species. But albacore are represented by 300 samples, bigeye tuna by 500 samples, yellowfin tuna by 700, southern bluefin tuna by 300 samples; there are others.

From this storehouse, Dr. Fujino has drawn the materials for a series of scientific papers for journals in this country and abroad. One of his papers outlines what is known of the subpopulation structure of the skipjack tuna in the Pacific Ocean. He reports that the skipjack tuna of the tropical western Pacific, those taken in the waters of the Trust Territory, belong to a subpopulation that does not appear in the Hawaiian fishery. Also different from the Hawaiian fish are those taken in Japanese coastal waters. Whether these differ from those of the Trust Territory is not yet known.

Questions Remain

There is some evidence that the skipjack tuna of the Hawaiian fishery may consist of representatives of more than one subpopulation, but the evidence is not yet clear. Nor is it entirely clear whether the skipjack tuna of Hawaii and those of the eastern Pacific come from a common population, or whether there is a population in one of the two areas that does not appear in the other area.

Dr. Fujino recommends that genetic studies throughout the Pacific be prosecuted more intensely--and that they be backed up by tagging fish in certain areas to determine what migratory patterns may exist.



## Tag Offshore Lobsters

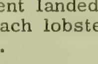
BCF and the Massachusetts Division of Marine Fisheries are conducting extensive tagging operations on offshore lobster grounds during April. The program began in March and will continue in June. The BCF research vessels "Albatross IV" and "Delaware" will be used during 3 cruises to catch, tag, and release 6,000 lobsters on the Continental Shelf fishing grounds.

This tagging study is part of the lobster research program of the BCF Biological Laboratory at Boothbay Harbor, Maine. The Exploratory Fishing and Gear Research Base at Gloucester, Mass., is cooperating while conducting exploratory fishing with deep-water lobster pots designed especially for the offshore fishing grounds.

The Tags

All lobsters are being tagged with back tags of bright-yellow vinyl plastic. The tags are coded and numbered to designate time and place of release. The commercial lobster fleet may expect to catch these tagged lobsters for several years because the tag is retained through successive moults. Lobstermen who catch the tagged lobsters will be paid the current landed value, plus a $1.00 reward for each lobster delivered to port with tag intact.

Information gathered will be used to determine migration patterns, growth rates and mortality rates of offshore stocks.



## Ann Arbor Holds Training Seminar

A training seminar designed to exchange information and ideas between BCF and industry was held in Green Bay, Wisc., March 8-9. It was organized by BCF's Exploratory Fishing and Gear Research Base at Ann Arbor, Mich.

BCF personnel from biology, exploratory fishing, technology, marketing, and economics provided much useful information to fishermen and processors. Their subjects were: status of fish stocks and production, fish harvesting and handling procedures, processing and packaging, market expansion, and fishery economics.

State Representatives Attended

Personnel from the conservation departments of New York, Michigan, Wisconsin, and Pennsylvania also attended. They were particularly interested in fishing methods and equipment useful in controlling rough fish--and to investigate commercial fishing possibilities.

## Miami Lab Has New Radio Station

A powerful new radio station became operational on March 11 at BCF's Tropical Atlantic Biological Laboratory (TABL) in Miami, Fla. The 1,000-watt, 4-frequency Coastal Station--call letters KAG--makes possible immediate voice contact between the lab and research vessels at sea. Theoretically, the station can reach ships by voice anywhere in the world. It has contacted regularly TABL's research vessel "Undaunted," which is investigating waters 6,000 miles away--off Angola, West Africa. The station will improve TABL's coordination and direction of its oceanographic activities.

Other Agencies Can Use It

TABL will share the station with other oceanographic institutions in the Virginia Key area--with ESSA and the Institute of Marine Sciences. Both agencies often send ships to distant waters for long periods.

Before, with few exceptions, contact between oceanographic vessels on the high seas and their land bases was by written radiogram. Often, important communications were delayed for many hours. "Now scientific findings can be dictated by radio directly to a tape recorder at the home lab, transcribed within a few minutes, and placed under study the same day they were gathered aboard the research vessel."

## 'Geronimo' Is Taken Out of Service

BCF's research vessel Geronimo was laid up on March 8, 1968. Studies had shown that her research could be done more effectively and economically by BCF's "Undaunted" and by other vessels available in the Gulf of Mexico area.

The Geronimo was transferred from Washington, D. C., to the Gulf area in 1965 and based at Galveston, Texas.

In 1963, she worked with the communications satellite "Syncom II" to transmit oceanographic data. In 1964, she participated in the International Cooperative Investigation of the Tropical Atlantic.

The vessel, a converted tugboat built in 1944, is 143 feet long and displaces 760 tons.

## BCF and Industry Promote Rainbow Trout

BCF and industry have been successful in introducing fresh rainbow trout to markets in the Cleveland, Ohio, area. In 3 days at the end of February, 1,200 pounds of the trout were flown in and sold through a supermarket chain. More orders were placed the next week. Akron, Ohio, is next on the trout-promotion list.

Cleveland is the latest inland area in which BCF has generated interest in air shipments of fishery products.

## Safety Bulletins Issued on Explosives, Radar Use

BCF's Northeastern Region, Gloucester, Mass., has issued 2 important fishing vessel safety bulletins:

I. EXPLOSIVE ORDNANCE--WARNING TO FISHERMEN

All fishermen are warned of the danger of snagging explosive ordnance in their fishing gear. Explosives have been reported snagged in nets or dredges from the Gulf of Mexico to the Gulf of Maine. Most hazardous area is east of Cape Henry between 36-00 and 37-00 N. latitude and 74-40 and 75-00 W. longitude.

The U. S. Coast Guard advises all fishing vessel captains to regard any metallic object having fins, propeller or horns as dangerous. If in doubt about its identify--treat it as an explosive and do not attempt to bring it alongside or aboard. Release it and notify the nearest Coast Guard or Navy station--giving your position and description of the object.

If unable to release the object:

(1) Stream it aft as far as possible (2) keep crew forward away from stern of vessel (3) notify Coast Guard and stand by for instructions.

If a suspected explosive is not detected until brought on board:

(1) Lash securely in place immediately. (2) Keep it covered and wet down (3) avoid touching or jarring (4) notify Coast Guard or Navy immediately.

Locations of reported snagging by fishing vessels may be obtained from BCF--408 Atlantic Avenue, Boston, Mass. 02210.

II. RADAR AND WOODEN HULLS

BCF advises all fishing vessel operators that radar equipment should be used with a thorough understanding of its capabilities and limitations. One disadvantage of radar is its weakness in returning a picture from wooden objects. Only a small percentage of the 780 documented fishing vessels operating from New England ports is of steel construction--so your radar operations on the fishing grounds are confined almost entirely to wooden hulls. It is believed that fiberglass hulls react in like manner to radar waves.

The radar picture your vessel presents is directly proportional to the amount, location, and shape of metal surfaces on board. Request a radar check of your vessel from one of your fishing fleet companions. This should be carried out in clear weather at known distances. If your vessel does not register sharp and clear, then action should be taken to increase the radar visibility. Excellent methods of providing this extra protection and safety are: (1) Installation of radar targets on the mast head--similar to targets used by U. S. Coast Guard on navigational buoys; (2) increasing amount of metal surfaces on spars and pilot house.

# ARTICLES

## DETECTION OF FISH SCHOOLS BY SONAR
## (Eastern Tropical Pacific, July-November 1967)

By Robert I. McClendon*

In 1967 an investigation of the physical and biological oceanography of the eastern tropical Pacific was begun. This program, known as EASTROPAC, is intended to provide the necessary data for more effective use of marine resources of the area, especially tropical tunas. The investigation is coordinated by the Bureau of Commercial Fisheries (BCF) at its Fishery-Oceanography Center, La Jolla, California. Other United States Government agencies participating are the Coast Guard, Environmental Science Services Administration, The Naval Oceanographic Office, and the Smithsonian Institution. Other participants include the Scripps Institution of Oceanography of the University of California San Diego, Texas A & M University, and the University of Miami, Coral Gables, Florida. International cooperation is given by the Inter-American Tropical Tuna Commission at the Fishery-Oceanography Center, and its member nations--Chile, Ecuador, Mexico, and Peru.

The area from 20° N. to 20° S. and from the coast of South America to 126° W. is covered by multiple-ship (4 to 5 vessels) survey cruises. Single-vessel monitoring cruises are made bimonthly from 20° N. to 20° S. and from 98° W. to 119° W.

This report concerns occurrence of fish schools as determined from the sonar data collected aboard the BCF research vessel "David Starr Jordan" (fig. 1) on two EASTROPAC monitoring cruises during July 10 through November 27, 1967. Because data for Legs 1 and 2 for these two cruises were not available for comparison, only the information from Acapulco, Mexico, to the end of the cruise was used. The number of targets encountered on each cruise may be used as a measure of productivity and fish population in the area covered. A target is defined as any object in the open sea that appears on the sonar recorder. The presence of echoes was used as an indication of fish schools.

Fig. 1 - The Bureau's research vessel David Starr Jordan. (Photo: Herb Reynolds)

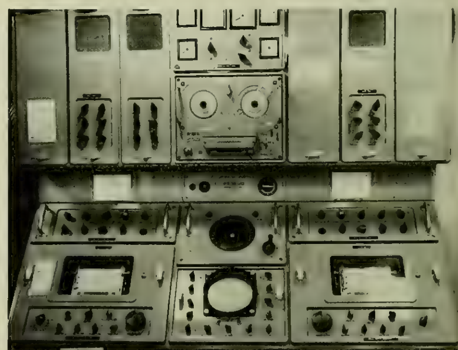


Fig. 2 - Operator's control and display console showing the 11 kHz unit on the right and the 30 kHz unit to the left.

The Simrad Research Sonar, Model 580-10[1] (fig. 2), on the Jordan is designed for research. It is more versatile, more powerful, and has a much greater range than the sonar units on most fishing vessels. Although the complete

*Fishery Biologist, BCF Fishery-Oceanography Center, La Jolla, California.
1/Mention of firm does not imply endorsement by BCF.

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installation comprises two combination sonar/depth sounder sets operating at 11 kHz and 30 kHz (1 kHz equals 1,000 cycles per second), only the information from the 11 kHz set was used for this particular study. The 11 kHz transducer was aimed 10° off the starboard bow and set at a range of 2,500 meters. Thus, the sonar beam of approximately 23° covered a horizontal band about one-half nautical mile wide. As the ship moved through the water at an average speed of 10 knots, an area of about 5 square miles was searched each hour. In a day's running, an area of 75-85 square miles was sampled.

Unless identified otherwise, all targets included in this study were assumed to be fish, either single specimens or schools. Undoubtedly some debris floating in the water was encountered on both cruises. The number of these inanimate objects for cruise 30 was not available, but on cruise 50, during daylight, sight records of all surface objects were kept. Only two of nearly a thousand targets were disregarded when they were identified as driftwood. Because so few nonbiological targets were encountered during the day (0.02 percent of identified targets), I believe that they may be considered of no consequence in the data. Since the probability of nonbiological targets should be the same day or night, I assume that few of the nighttime targets on either cruise were flotsam.

Only a few fish schools other than flyingfish were sighted on the surface within the sonar beam; therefore the species composition of the schools recorded is not known. Skipjack tuna and "bait" (unidentified) were the only sightings. Whales and porpoises were sighted often from the ship but were recorded only twice. Although some porpoises and whales are frightened by sonar at certain frequencies, research to date has shown no reaction by fish at the sonar frequencies used (Miyaki 1952, Cushing and Richardson 1955). It is assumed, therefore, that fish in the area covered by this survey were not disturbed by the sonar.

The number of targets in 6-hour periods are shown on the track charts of the two cruises (figs. 3 and 4). The number of targets are estimates of total population along the track lines. The targets recorded for daylight hours were estimated from running time and expressed as targets per mile; the number of targets recorded for nighttime was adjusted for the day-night difference.

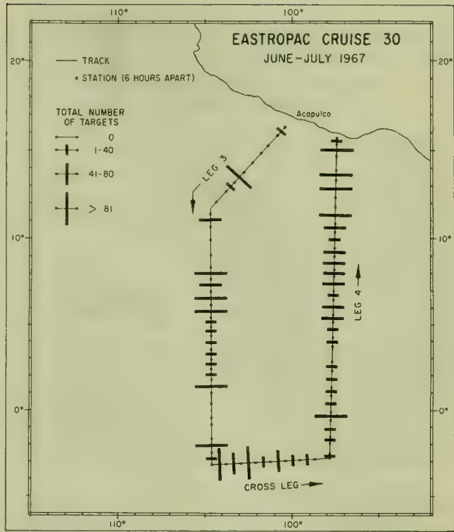


Fig. 3 - Estimated total population per 6-hour interval based on number of targets recorded on EASTROPAC cruise 30.

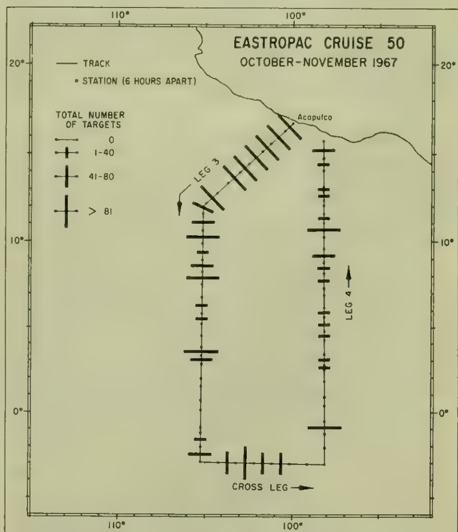


Fig. 4 - Estimated total population per 6-hour interval based on number of targets recorded on EASTROPAC cruise 50.

| Total Targets Recorded by Time and Distance | | | | | | |
|---|---|---|---|---|---|---|
| | Cruise 30 | | | Cruise 50 | | |
| | Targets | Miles Between Stations | Targets Per Sq. Mile | Targets | Miles Between Stations | Targets Per Sq. Mile |
| Leg 3 | | | | | | |
| 0600-1200 | 280 | 342 | 1.64 | 350 | 360 | 1.94 |
| 1200-1800 | 72 | 264 | 0.55 | 264 | 285 | 1.85 |
| 1800-2400 | 48 | 330 | 0.29 | 17 | 387 | 0.09 |
| 0000-0600 | 23 | 336 | 0.14 | 14 | 258 | 0.11 |
| Total | 423 | 1,272 | 0.67 | 645 | 1,290 | 0.98 |
| Cross Leg | | | | | | |
| 0600-1200 | 27 | 104 | 0.52 | 65 | 124 | 1.05 |
| 1200-1800 | 96 | 104 | 1.85 | 24 | 63 | .76 |
| 1800-2400 | 11 | 104 | 0.21 | 5 | 124 | 0.08 |
| 0000-0600 | 23 | 104 | 0.44 | 4 | 124 | 0.06 |
| Total | 157 | 416 | 0.75 | 98 | 435 | 0.45 |
| Leg 4 | | | | | | |
| 0600-1200 | 265 | 374 | 1.42 | 159 | 324 | 0.98 |
| 1200-1800 | 196 | 192 | 2.04 | 41 | 258 | 0.32 |
| 1800-2400 | 32 | 354 | 0.18 | 3 | 282 | 0.02 |
| 0000-0600 | 20 | 210 | 0.19 | 7 | 252 | 0.06 |
| Total | 513 | 1,130 | 0.91 | 210 | 1,116 | 0.38 |
| Total for cruise | 1,093 | 2,816 | 0.78 | 953 | 2,851 | 0.67 |

Table shows that consistently more contacts were recorded during daytime than during darkness. Figure 5 also shows this difference; further, it indicates a trend toward more targets in first half of the daylight interval; the exceptions are the Cross Leg and Leg 4 of cruise 30, where more targets were seen during second half. The difference in number of targets between nighttime intervals seems completely random.

Precise measurement of size differences between schools was not attempted during this study, but differences could be seen. The recordings showed little, if any, difference between the size of schools recorded during the day and those recorded at night.

Richard R. Whitney, in a study of more than 34,000 purse seine sets in 1954-62 (unpublished manuscript), used logbook records to tabulate sets at different times of day. He found a difference in tuna catch from day to night which could not be explained solely by the relative number of sets attempted. He mentioned diurnal vertical migration as one possible explanation.

If we accept Whitney's statement that tuna schools ". . . probably do not disperse at night," we can assume that the diminished number of schools during hours of darkness indicates a diurnal change in the depth at which schools are likely to be found. Diurnal vertical migration is well known in many species of schooling fish; it has been shown by changes in amount of catch by fishing gear as well as by direct studies (Woodhead 1964).

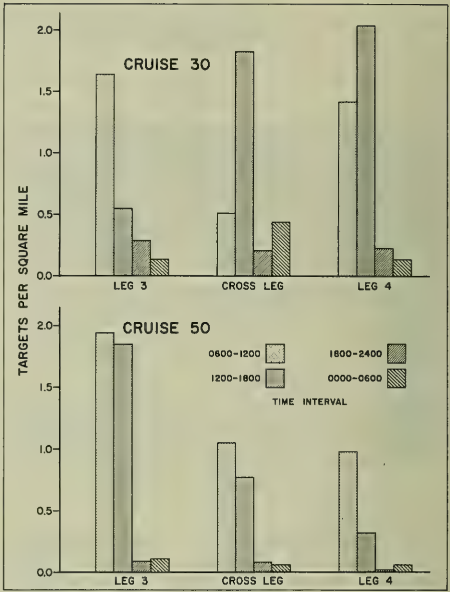


Fig. 5 - Distribution of targets per square mile by time interval for EASTROPAC cruises 30 and 50.

Aschoff (1964) stated that light is a common stimulus for change in behavior, and that it is probably more important in the marine environment than on land. He suggested that competition between species is reduced by differential rhythmicity of behavior. The difference in times that different species appear at the surface during the day also suggests that they may be at different depths during the night.

The sonar on these cruises was recording targets primarily above the thermocline (about 50-60 meters deep); fish schools would be less likely to be detected below this depth. That schools disperse during darkness has been suggested (Blaxter 1964). Others (Scofield 1951, Sette 1950, Shaw 1961) have stated that starlight, skylight, and bioluminescence may be sufficient to enable some species to maintain their schools.

This study has shown the usefulness of sonar in the estimation of total population over a wide area in a short time. Had we depended on surface sightings alone to estimate the fish population on these two cruises, we would have tabulated a different distribution and a different total number of schools. If the difference between sonar recordings and surface sightings of fish schools is considered (approximately 100:1 on cruise 50), the value of sonar in direct support of fishing is seen. It was not possible to identify fish during the present study; however, research is being undertaken that may make it possible to do so with sonar equipment.

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## SAVING FINGERLINGS

A system for transporting fingerling fish safely downstream past a dam or similar obstruction was patented recently by John P. Roscoe of Cutten, Calif. Roscoe's solution provides a bypass flow that gives the fingerlings a descent ladder at one side of the dam. It requires only a relatively small amount of power to operate.

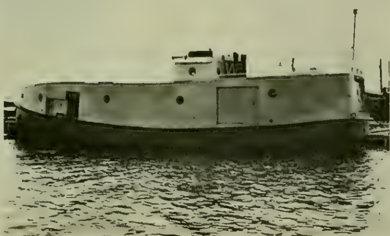
Although salmon and other fish can be transported upstream by fish ladders without difficulty, there is a problem in moving fingerlings downstream from spawning grounds especially when dams are of considerable height. The difficulty is that fingerlings tend to follow flowing currents. Such currents often pass through power turbines thus killing many of the fish. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966, by Science Service, Inc.)

# HOW LAKE SUPERIOR GILL NET VESSEL WAS CONVERTED TO TRAWLER

By Warren Handwork*

In Lake Michigan and Lake Erie, trawling is an efficient method for catching some species of commercial fish--smelt, chubs, and alewife. Vessels now used for trawling in the Great Lakes are mostly converted gill net vessels. (Gordon and Brouillard (1961) and Gordon (1962) described conversion methods.)

Experimental trawling was one part of an Economic Development Administration-Technical Assistance Project by the Bureau of Commercial Fisheries to help the commercial fishing industry of Lake Superior. Under this project, two gill net vessels were modified into trawlers to determine the feasibility of trawling for smelt, small chubs, and other underutilized species. This paper reports on the conversion of the "A. E. Clifford," a 45-foot, steel, gill net vessel operating out of Ontonagon, Michigan (fig. 1).


BEFORE CONVERSION


AFTER CONVERSION

Fig. 1 - The A. E. Clifford.

## VESSEL CONVERSION

The A. E. Clifford was converted into a trawler in June 1966. The conversion features a minimum of structural alterations--but allows the vessel to function either as a stern trawler or a gill netter. No portion of the superstructure was removed, so the vessel retains the enclosed deck. The only structural modification was the installation of a hinged hatch cover for an opening cut in the top deck at the stern. The 4-foot square opening facilitates hoisting trawl catches aboard (figs. 2 and 3). Trawling equipment installed on the main deck in no way interferes with gill netting.

The A. E. Clifford's principal dimensions are: length overall, 45 feet; beam, 12 feet 10 inches; and draft, 6 feet. The vessel has a 120-horsepower diesel engine, which drives a 42-inch diameter by 38-inch pitch propeller through a 2:1 reduction gear. The vessel's cruising speed is 10 miles per hour. A 5-kilowatt generator supplies alternating current to lights and an oil furnace. The main engine electrical system furnishes the 12-volt direct current that operates an automatic pilot and echo sounders.

## DECK EQUIPMENT

All deck equipment is powered hydraulically (figs. 4 and 5). A power-take-off unit from the main engine drives the two hydraulic pumps that provide independent power to each trawl winch. Each pump is rated at 17 input horsepower and pumps 17 gallons per minute at 900 revolutions per minute. Maximum working pressure of the hydraulic system is 1,500 pounds per square inch. Two single-spool directional valves operate the

*Fishery Methods and Equipment Specialist, BCF, Exploratory Fishing and Gear Research Base, Ann Arbor, Mich.

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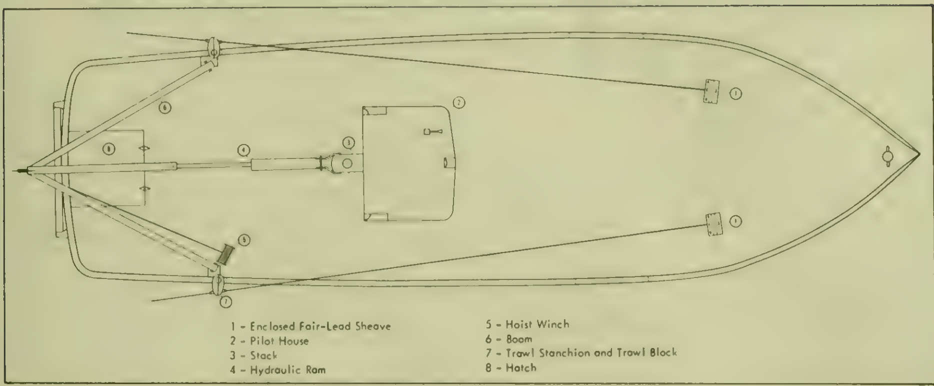


Fig. 2 - Schematic of A. E. Clifford showing top deck arrangements.

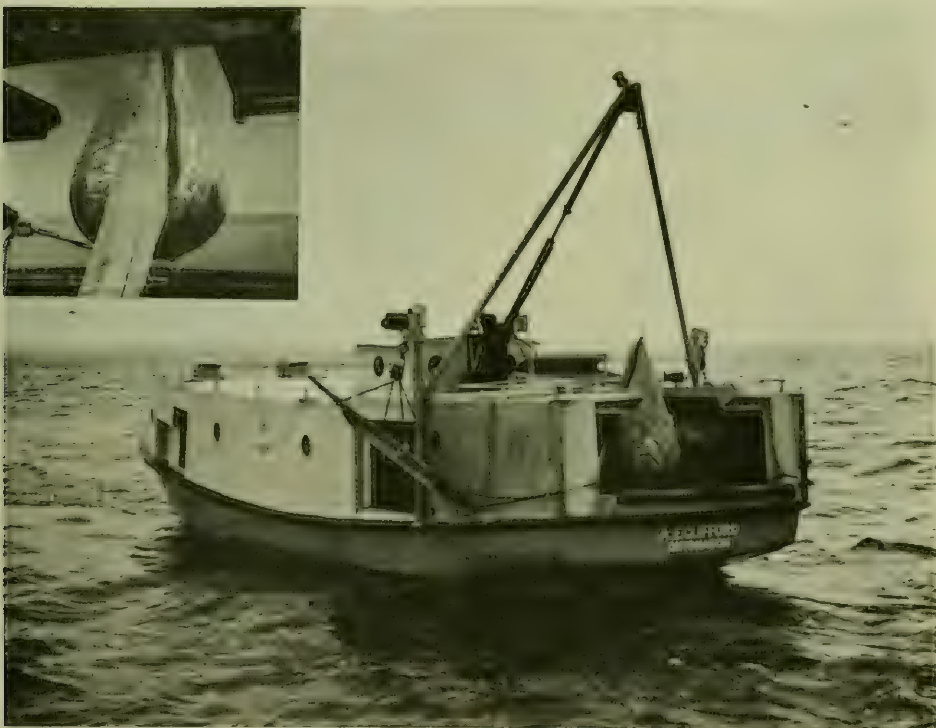

Fig. 3 - A 450-pound catch of chubs being brought aboard, August 1966.

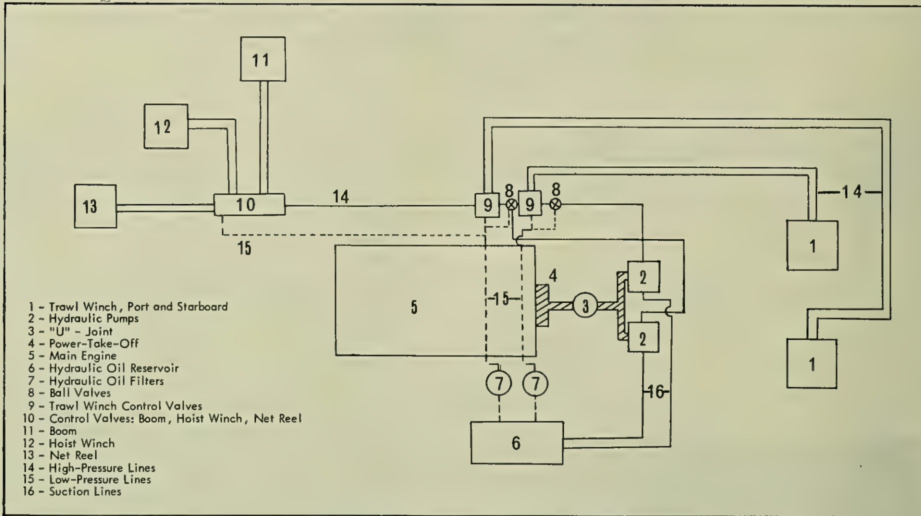


Fig. 4 - Hydraulic system of the A. E. Clifford.

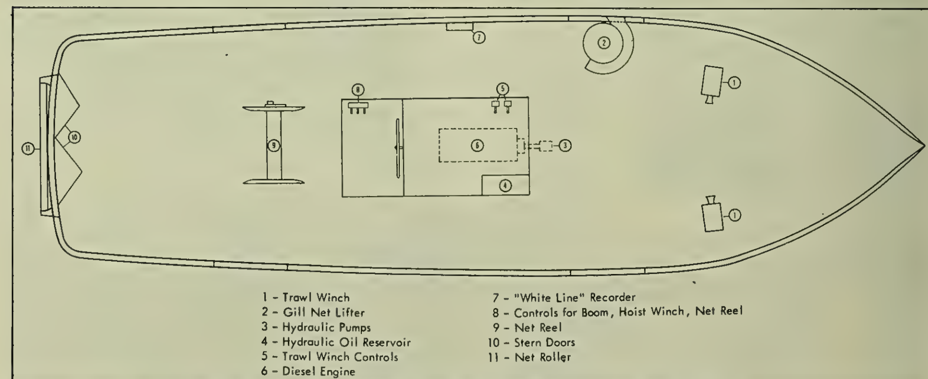


Fig. 5 - Schematic drawing of A. E. Clifford showing main deck arrangements.

trawl winches; a 3-spool directional value operates the net reel, overhead boom, and hoist winch. The controls are accessible to the operator while he watches the trawling operation.

Two single-drum winches are located forward, port and starboard, to afford more working-deck space at the stern (figs. 4, 5, 6, 7). Each drum is 13 inches wide with 20-inch diameter flanges and 6-inch diameter core. Its capacity is 2,000 feet of $\frac{3}{8}$-inch diameter wire rope. Overall dimensions of the winches are: 30 inches long, 36 inches wide, and 26 inches high. Each winch has line pull of about 3,000 pounds bare drum and 1,200 pounds full drum, and an average line speed of about 200 feet per minute. Each winch is equipped with an independent gypsy head and controls for the clutch and the brake. The trawl warps are routed upward from the winches through two enclosed 4-inch wide by

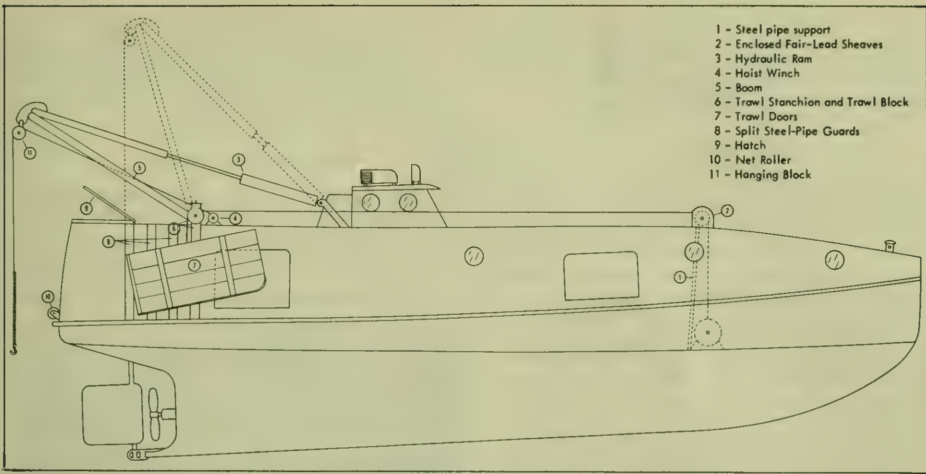


Fig. 6 - Outboard profile of the A. E. Clifford.

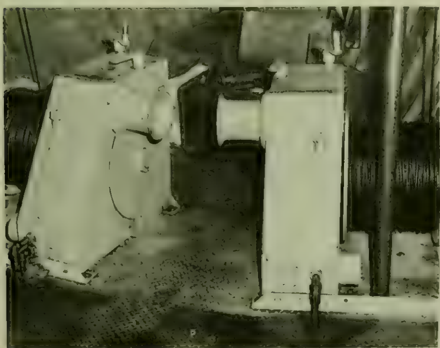

Fig. 7 - Hydraulic winches used in trawling.

8-inch diameter sheaves, mounted on the top deck directly above the winches (figs. 1, 2, 3, and 6). The sheaves move freely on a $1\frac{1}{2}$-inch diameter by 13-inch long horizontal steel shaft to provide unassisted level winding of the trawl warps during hauling. A 2-inch, extra-heavy, steel pipe is mounted vertically from the main deck to each base of the sheave housing for support (fig. 6). The warps then lead aft where they pass through two 4-inch wide by 8-inch diameter trawl blocks hanging from 4-inch diameter, extra-heavy, steel pipe stanchions located at the stern. The 6-foot stanchions are welded to the rub rail at the bottom and to the edge of the top deck. The ends of the warps are attached to the trawl doors. A series of half-round guards made from split 3-inch steel pipe is welded between the rub rail and roof line to protect the sides of the deck house from the trawl doors (figs. 1 and 6).

The net reel, which is used for retrieving and storing the trawl sweep lines and net, has a drum with 41-inch diameter flanges and a 10-inch diameter by 50-inch long core.

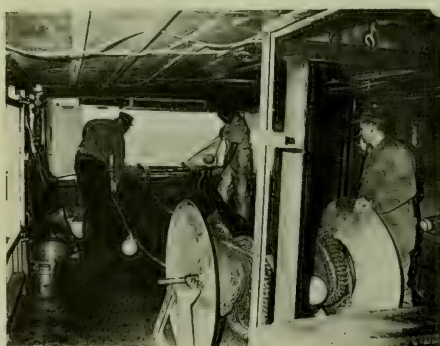

Fig. 8 - Hydraulic powered net reel used to retrieve and store trawl net.

It is on the main deck directly behind the pilot house (figs. 4, 5, and 8). The net reel has a line pull of about 1,800 pounds, and a line speed of 30 feet per minute--both bare-drum ratings. It is equipped with hand-operated brake and clutch.

A roller, which consists of an 8-foot length of 4-inch, extra-heavy, steel pipe riding on steel ball-bearing mounts at each end, is at the stern opening to reduce friction and net wear during setting and hauling of the trawl net over the stern bulwarks (figs. 1, 3, and 5).

An A-frame boom, made of 3-inch, extra-heavy, steel pipe, is mounted on the top deck at the rear. The boom is used to lift the trawl catch aboard. A hydraulic ram cylinder, with a 4-inch diameter bore and 48-inch stroke, operates the boom. The cylinder is mounted between a clip of 1-inch steel plate anchored firmly to the stack plating and a $6\frac{1}{2}$-foot piece of 3-inch pipe fastened to the apex of the A-frame. The legs of the boom are $12\frac{1}{2}$ feet long and are hinge-mounted at the base on 12-inch square pieces of $\frac{1}{2}$-inch steel plate welded to the top deck. A 4,000-pound capacity hoist winch is mounted on the top deck adjacent to the base of the boom's starboard leg (figs. 1, 2, 3, 4, and 6). The winch contains 50 feet of $\frac{5}{16}$-inch diameter wire rope that passes through a 6-inch diameter block hanging from the apex of the boom.

Electronic Equipment

A recording echo sounder with fish-discriminating features having a 0- to 95-fathom depth range is used for detecting fish concentrations and monitoring bottom conditions. The recording unit is mounted on the portside near the steering wheel, where it may be easily observed by the vessel operator (fig. 9). The automatic pilot is part of the vessel's original equipment.

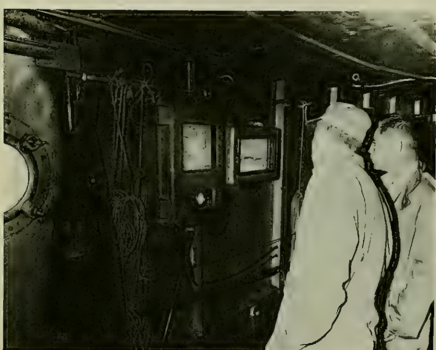

Fig. 9 - High resolution echo sounder with fish-discrimination features is unit right.

Trawl Nets and Doors

Sizes of trawl nets and trawl doors are governed primarily by the vessel's power. The A. E. Clifford has successfully fished a 52-foot (headrope) Gulf of Mexico type shrimp trawl, and a 70-foot (headrope) wing trawl. Trawl doors measure 84 inches by 39 inches and weigh about 300 pounds each.

Conversion Costs

The total cost of converting the A. E. Clifford to trawling was $9,700. Some of the labor performed by the vessel owners was not included in the labor costs. Following is a breakdown of costs:

| Item | Cost in Dollars |
|---|---|
| A. Hydraulic equipment: | |
| Two single drum trawl winches | $2,880 |
| One net reel . . . . . . . . . . . . . | 1,285 |
| One hoist winch . . . . . . . . . . . | 200 |
| One ram cylinder . . . . . . . . . | 150 |
| Jack shaft assembly . . . . . . . . | 340 |
| Pumps, valves, reservoir, and filters . . . . . . . . . . . . | 529 |
| Lines and fittings . . . . . . . . . | 311 |
| B. Electronic equipment: | |
| Recording echo sounder with fish-discriminating features . | 1,400 |
| C. Fishing hardware: | |
| Blocks, wire rope, shackes, swivels, thimbles, etc. . . . . | 600 |
| D. Construction materials: | |
| Steel plate, pipe, angle iron, etc. | 428 |
| E. Fishing gear: | |
| One 52-foot (headrope) trawl . | 400 |
| One pair of trawl doors, 7 feet by 39 inches . . . . . . . . . . . | 200 |
| F. Labor: | |
| Welding . . . . . . . . . . . . . . . | 977 |
| Total . . . . . . . . . . . . . . . . . | $9,700 |

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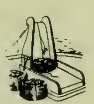


## NORTH PACIFIC HALIBUT RECOMMENDED BY BUREAU OF COMMERCIAL FISHERIES

The Department of the Interior's Bureau of Commercial Fisheries (BCF) said that North Pacific halibut will be especially abundant during the late spring and early summer.

The halibut is the largest of the so-called "flatfishes," and the greatest proportion of the U. S. catch is found in the cold water of the North Pacific off the coasts of Washington, Alaska, and British Columbia, where the fishery is regulated by the International Pacific Halibut Commission. This Commission sets an annual quota in pounds which may be taken commercially. On the North Atlantic coast, where halibut is taken in much smaller amounts, there are no regulations as to seasons, size of catch, or fishing areas, so some landings are made throughout the year.

BCF Director H. E. Crowther, a member of the Halibut Commission, said commercial halibut range from 5 to more than 80 pounds, with a few as large as 400 pounds being landed. About 2 pounds of halibut steaks will provide average servings for six people.

The BCF test kitchens have developed several halibut recipes, among them this one for broiled halibut steaks:

### BROILED HALIBUT STEAKS

2 pounds halibut steaks, fresh or frozen
2 tablespoons melted fat or oil
2 tablespoons lemon juice
1 teaspoon salt
$\frac{1}{2}$ teaspoon paprika
Dash pepper

Thaw frozen fish. Cut fish into 6 portions. Place fish in a single layer, on a well-greased baking pan, 15 by 10 by 1 inches. Combine remaining ingredients and mix well. Pour sauce over fish. Broil about 4 inches from source of heat for 10 to 15 minutes or until fish flake easily when tested with a fork. Baste once during broiling with sauce in pan. Makes 6 servings.

Additional halibut recipes are available in the BCF publication "How to Cook Halibut," available for 25¢ from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

# INTERNATIONAL

## U.S. and Mexico Agree on Fishery Zones

On Jan. 4, in El Paso, Texas, the International Boundary and Water Commission (U. S. and Mexico) outlined provisional boundaries between the exclusive fishery zones of the U. S. and Mexico in the Gulf of Mexico and the Pacific Ocean.

These boundaries were drawn to implement the U. S.-Mexico fishery agreement of Oct. 27, 1967. The 2 countries granted reciprocal privileges to fishermen to continue fishing between 9 and 12 nautical miles off each other's coasts for 5 years commencing Jan. 1, 1968. Both enacted legislation in 1966 reserving the right to fish within 12 miles of their coasts for their own citizens--except when fishing privileges are specifically granted to foreign fishermen by international agreements.

Gulf's Provisional Boundary

The provisional boundary for the Gulf of Mexico runs straight out to sea 12 nautical miles along the parallel of latitude passing through the middle of the Rio Grande's mouth. At present, this is the parallel of 25°57'15" N. latitude.

Pacific Boundary

In the Pacific Ocean, the provisional boundary is a "median line." This means that each point on it is equally distant from the nearest points on the baselines of both countries' territorial seas. For its first $5\frac{3}{4}$ nautical miles, the line prolongs the land boundary and runs from 32°32'03" N. latitude, 117°07'24" W. longitude, to 32°31'29" N. latitude, 117°14'10" W. It then turns approximately northwestward for $2\frac{1}{4}$ nautical miles to a point midway between Point Loma and the Coronado Islands, at 32°33'12" N. latitude, 117°15'51" W. longitude. From the latter point, it runs straight to 32°35'32" N. latitude, 117°27'46" W. longitude, which is 12 nautical miles from both Point Loma and the Coronado Islands.

Boundaries Now Effective

The provisional boundaries have been approved by both Governments and are now effective. (Dept. of State, Feb. 15, 1968.)

## EEC Reports on Fisheries

Consumption of fish in the European Economic Community (EEC), the Common Market, for 1966 was 2.1 million metric tons; 80 percent was supplied by members' fisheries. If shellfish are included, the figure becomes 90 percent.

Because the EEC produces such a large portion of its own consumption of fishery products, protectionist tendencies may be strengthened in formulating its Common Fisheries Policy.

July 1 Target

EEC's Agriculture Committee recently urged that work on this policy be accelerated so that its provisions can be implemented as near the July 1 target date as possible. Efforts will be made to assure firm establishment of a Fisheries Policy prior to the admission to membership of other nations. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 13, 1968.)

## FAO Fishery Committee for Eastern Central Atlantic Being Organized

An FAO Fishery Committee for Eastern Central Atlantic is being organized following approval of its formation at the 48th Session of the FAO Council.

The following countries have joined: Congo (Kinshasa), Cameroon, Gambia, Greece, Italy, Ivory Coast, Japan, Korea, Poland, Senegal, Spain, Togo, and the United Kingdom. Thirteen other countries including the U. S. have not yet decided whether to join. (U. S. Embassy, Rome, Feb. 7, 1968.)

## ICES Convention to Enter into Force

Italy has ratified the Convention for the International Council for the Exploration of the Sea. The Danish Government is informing all Contracting Parties that the new Convention

will enter into force on July 22, 1968. (Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 9, 1968.)

## Japanese-Australian Shrimp Ventures Planned

Spurred by high prices, 3 major Japanese fishing firms are each planning to import shrimp from Australia under a develop-and-import formula. The trio--Nippon Suisan Kaisha, Taiyo Fishery Co., and Kyokuyo Hagei--recently applied to the Australian Government for permission to set up joint firms with Australian interests. Approval is expected because Australia reportedly supports the projects fully.

For 2 years, the 3 fishing firms had been test catching shrimp in the Gulf of Carpentaria and the Arafura Sea, off northern Australia. Shrimp resources are bountiful there.

The large, tasty shrimp have enjoyed good sales. They are called tiger and banana.

Tiger and Banana

In Japan, the tiger shrimp are sold wholesale between ¥1,300,000 and ¥1,400,000 (approx. $3,610-$3,880) per ton. This is US$1.64-1.76 a pound.

The banana shrimp sell for between ¥1,100,000 and ¥1,200,000 (about US$3,055-$3,333). This is US$1.39-1.51 a pound.

Those imported from the Soviet Union, Southeast Asia, and Mexico range between ¥900,000 and ¥1 million (approx. $2,500-$2,800 or US$1.10-1.27 a pound).

Joint Ventures

Nippon Suisan is planning to join with C. Itoh & Co. and set up Northern Research. This will be capitalized at A$1,000,000 (US$1.13 million) jointly with Hickman Distributors, a food maker.

Taiyo is planning to create North Australia Fisheries with William Angliss & Co., a food maker. Capital: A$300,000 (US$339,000).

Kyokuyo plans to form Gollin Kyokuyo Fishing Co., capitalized at A$100,000 (US$113,000), with Gollin Holding Ltd., a trading firm.

Each of the 3 Japanese firms will own more than half the shares of the projected companies.

Japanese fishing vessels and crewmen will be used during the first 5 years.

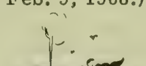
From the 6th year, the fishing vessels will be obtained locally at the Australian Government's request to help the local shipbuilding industry. Local labor also will man the vessels. ("Nihon Keizai Shimbun," Feb. 13, 1968.)

## 7 Weeks of World Baleen Whaling

The world baleen whale catch in Antarctic Ocean after 7 weeks (on Jan. 27) was 1,214 BWUs (blue-whale units), reports the International Whaling Commission Secretariat. That is about 300 BWUs fewer than the 1,527.4 BWUs reported for the 1966/67 period. However, the rate of kill is not bad because the present catch quota is 3,200 BWUs, while that for the previous, or 21st, season was 3,500 BWUs.

Japan Far Ahead

Catch by country as of Jan. 27 was: Norway (1 fleet) 128, the USSR (3 fleets) 372, and Japan (4 fleets) 714. However, the best season for Antarctic ocean whaling is normally between the 8th and 12th week. ("Suisan Tsushin," Feb. 9, 1968.)



## Sweden Supplies FPC to Ethiopia

The Swedish International Development Agency has shipped 100 kilograms (220 pounds) of fish protein concentrate (FPC) to Ethiopia. It was the first FPC shipment under the Agency's aid program for Ethiopia. The product was developed a year ago by Asta Nutrition Co. of Sweden as a nutritional human food additive. The FPC will undergo a flavor acceptability test as a potential ingredient in

a children's diet supplement. It will be used under rigidly controlled conditions. ("Suisan Keizai Shimbun," Feb. 7, 1968, U. S. Embassy, Addis Ababa, Feb. 12, 1968.)

## World Fish Meal Production in 1966 and 1967

| | 1967 | 1966 |
|---|---|---|
| | . . . (Metric Tons) . . . | |
| Canada | 89,434 | 88,344 |
| Denmark | 149,261 | 107,915 |
| France | 13,200 | 13,200 |
| German Fed. Repub. | 72,576 | 73,443 |
| Sweden | 7,824 | 6,189 |
| United Kingdom | 80,487 | 85,906 |
| United States | 167,154 | 175,586 |
| Angola | 2/ 24,118 | 54,670 |
| Iceland | 112,849 | 175,831 |
| Norway | 491,562 | 421,725 |
| Peru | 1,815,983 | 1,470,478 |
| So. Afr. (including S.-W. Africa) | 345,000 | 257,565 |
| Belgium | 1/3,780 | 4,500 |
| Chile | 130,866 | 194,221 |
| Morocco | 35,000 | 32,470 |
| Spain | 43,600 | 27,583 |
| Total | 3,582,694 | 3,189,626 |

1/Avg. monthly production in 1967: 315 tons.
2/Data available only for Jan.-July 1967.
Notes: Monthly data may not add to annual total because of revisions.
Japan does not report monthly fish meal production to the International Association of Fish Meal Manufacturers (IAFMM). Estimate for 1967 of fish meal and other animal meal (mostly fish meal) is 350,000 metric tons; 347,000 metric tons in 1966. (Foreign Agricultural Service, Tokyo, Nov. 15, 1967.)
Source: IAFMM.

## FEO Exports in 1966 and 1967

Fish meal exports in 1967 reported by members of the Fish Meal Exporters Organization (FEO) show a 24-percent increase over 1966. FEO countries annually account for 90 percent of world exports. FEO members shipped 2.6 million metric tons in 1967, 2.1 million tons in 1966. Angola is excluded because comparable monthly data are not available.

Compared with 1966, Chilean exports in 1967 declined 40 percent and Icelandic 22 percent; Norwegian increased 85 percent, South African/South-West African 73 percent, and Peruvian 20 percent.

| | 1967 | 1966 |
|---|---|---|
| | . (1,000 Metric Tons) . | |
| Chile | 111.2 | 185.9 |
| Angola | 1/ | 53.6 |
| Iceland | 135.0 | 172.7 |
| Norway | 487.5 | 266.4 |
| Peru | 1,560.9 | 1,304.5 |
| So. Africa (includ. S.-W. Africa) | 286.0 | 165.6 |
| Total | 2/2,580.6 | 2,148.7 |

1/Not available (28,903 tons through Sept. 1967).
2/Excluding Angola.

Exports of fish meal from Angola through Sept. 1967 were down 22 percent from a year earlier (28,903 tons in 1967, 36,989 tons in 1966).

## ICES Scheduled Meetings

The 56th meeting of the International Council for the Exploration of the Sea (ICES) will be held in Copenhagen, Sept. 30-Oct. 9, 1968. The meeting will be preceded by a Symposium on Biology of Early Stages and Recruitment Mechanisms of Herring, Sept. 26-28. (U. S. Embassy, Copenhagen, Feb. 16, 1968.)

FORTHCOMING ICES MEETINGS:

July 23-27--Symposium on "Marine Food-Chains." Organized with support of FAO, ICNAF, and UNESCO. Place: Aarhus, Jutland, Denmark, at Aarhus University.

Sept. 26-28--Symposium on "Biology of Early Stages and Recruitment Mechanisms of Herring" Copenhagen (Charlottenlund), Denmark.

Sept. 30-Oct. 9--The 56th Statutory Meeting of the Council, Copenhagen.

## Sweden Will Aid Iran's Fishery Development

Sweden will help Iran develop her Persian Gulf fisheries by preparing a comprehensive plan to establish a modern fishery there. Iran will attempt to increase per-capita production of fish from present 1.1 lbs. to 11 lbs. within 10 years.

The fishing fleet will have 40 vessels and one mothership. More vessels will be added as fishery develops.

A training school is also to be constructed in southern Iran.

## International Fisheries Reference

The "Fisheries Year Book and Directory 1967-68," published by the British-Continental Trade Press Ltd., is now available from the publisher (222 Strand, London) at US$5. This international reference and directory of the fishing and fish-processing industries is useful to those involved in the international trade of fishery products.

Names and addresses of firms in many countries are classified: (1) Producers, exporters, and trawler owners, (2) importers and wholesalers, (3) canners, (4) machinery and equipment, and (5) shipbuilders, supplies, transport, and packaging.

Also, there are several articles on developments in the fisheries of various nations in the last few years; processing developments; mechanical unloading of fresh fish; pumping fish from net to vessel; etc.

## UN'S Caribbean Vessels Keep Busy

The 3 vessels connected with the UN/FAO Caribbean Fisheries Development Project were active in February. The "Alcyon" fished with hand lines on the Rosalind Bank, West of Jamaica, and on the margin of the Continental Shelf off Nicaragua and Honduras. About 12,000 pounds of fish, predominantly snapper, were landed at Kingston on Feb. 26. The vessel made a port call at Puerto Cabezas, Nicaragua.

The "Fregata" continued experimental fishing in the vicinity of the Netherlands Antilles, especially around Bonaire. Some success was reported in capturing flyingfish using drift gill nets and hand lines. Rough bottom conditions prevented plans to use bottom set lines. Experimental rafts that were set to attract fish disappeared before their effectiveness could be evaluated.

Port Calls

Port calls were made at Kralendijk, Bonaire, and Willemstad, Curacao. After "bilge keels" were added to the Fregata, she behaved better at sea.

The "Calamar"

The Calamar conducted exploratory trawling off French Guiana, Surinam, and Guyana. There was some gear damage off French Guiana, but good catches were made off Surinam and Guyana. Port calls were made at Cayenne and Georgetown, Guyana. At the latter port, the bulk of the catch was offloaded.

In Georgetown, the Calamar landed 22,874 lbs. of fish, of which 16,962 lbs. were sea trout. A small quantity was landed in Barbados when the vessel returned to home base.

Trawl Fish Landings

Commercial landings of trawl fish from the Guyana grounds are now made in Barbados. Up to the end of February, 4 trawlers had discharged their catches there. The fish are being purchased by the Barbados Marketing Corporation under a prearranged agreement. These landings resulted from the marketing demonstration carried out earlier by the Project through the Barbados Marketing Corporation using Calamar catches of trawl fish.

| Breadth of Territorial Seas and Fishing Jurisdiction Claimed by Members of the United Nations | | | |
|---|---|---|---|
| Country | Territorial Sea | Fishing Limits | Other |
| Albania. . . . . . . . . . . . . | 10 miles | 12 miles | |
| Algeria . . . . . . . . . . . . | 12 miles | | |
| Argentina. . . . . . . . . . . . | 200 miles | | |
| Australia . . . . . . . . . . . . | 3 miles | | |
| Barbados . . . . . . . . . . . . | | | |
| Belgium . . . . . . . . . . . . | 3 miles | 12 miles1/ | |
| Brazil. . . . . . . . . . . . . | 6 miles | 12 miles | |
| Bulgaria . . . . . . . . . . . . | 12 miles | | |
| Burma . . . . . . . . . . . . | do | | |
| Cambodia . . . . . . . . . . . | 5 miles | 12 miles | Continental Shelf to 50 meters including sovereignty over superjacent (lying above or upon) waters. |
| Cameroun . . . . . . . . . . . | 18 miles | | |
| Canada . . . . . . . . . . . . . | 3 miles | 12 miles | |
| Ceylon . . . . . . . . . . . . . | 6 miles | | Claims right to establish conservation zones within 100 nautical miles of the territorial sea. |
| Chile . . . . . . . . . . . . . . | 50 kilometers | 200 miles | |
| China. . . . . . . . . . . . . . | 3 miles | | |
| Colombia. . . . . . . . . . . . | 6 miles | 12 miles | |
| Congo (Brazzaville) . . . . . . . | | | |
| Congo (Leopoldville) . . . . . . | | | |
| Costa Rica . . . . . . . . . . . | 3 miles | | |
| Cuba . . . . . . . . . . . . . . | 3 miles | | |
| Cyprus . . . . . . . . . . . . . | 12 miles | | |
| Dahomey . . . . . . . . . . . . | 3 miles | 12 miles | |
| Denmark . . . . . . . . . . . . | do | do1/ | |
| Greenland . . . . . . . . . . . | | do | |
| Faroe Islands . . . . . . . . . | | do | |
| Dominican Republic . . . . . . | 6 miles | | 6-mile contiguous zone including fishing. |
| Ecuador. . . . . . . . . . . . . | 200 miles | | |
| El Salvador . . . . . . . . . . . | 200 miles | | |
| Ethiopia . . . . . . . . . . . . | 12 miles | | |
| Federal Republic of Germany . | 3 miles | 12 miles1/ | |
| Finland . . . . . . . . . . . . . | 4 miles | | |
| France . . . . . . . . . . . . . | 3 miles | 12 miles | |
| Gabon . . . . . . . . . . . . . | 3 miles | | |
| Gambia. . . . . . . . . . . . . | 3 miles | | |
| Ghana . . . . . . . . . . . . . | 12 miles | | Undefined protective areas may be proclaimed seaward of territorial sea, and up to 100 miles seaward of territorial sea may be proclaimed fishing conservation zone. |
| Greece . . . . . . . . . . . . . | 6 miles | | |
| Guatemala . . . . . . . . . . . | 12 miles | | |
| Guinea . . . . . . . . . . . . . | 130 miles | | |
| Guyana . . . . . . . . . . . . . | | | |
| Haiti . . . . . . . . . . . . . . | 6 miles | | |
| Honduras . . . . . . . . . . . . | 12 miles | | |
| Iceland . . . . . . . . . . . . . | do | 12 miles | |
| India . . . . . . . . . . . . . . | do | 100 miles | |
| Indonesia . . . . . . . . . . . . | do | | Archipelago theory. |
| Iran. . . . . . . . . . . . . . . | do | | |
| Iraq. . . . . . . . . . . . . . . | do | | |
| Ireland . . . . . . . . . . . . . | 3 miles | 12 miles1/ | |
| Israel . . . . . . . . . . . . . . | 6 miles | | |
| Italy . . . . . . . . . . . . . . | do | 12 miles1/ | |
| Ivory Coast . . . . . . . . . . . | 3 miles | | |
| Jamaica . . . . . . . . . . . . | 12 miles | | |
| Japan . . . . . . . . . . . . . . | 3 miles | | |
| Jordan . . . . . . . . . . . . . | | | |
| Kenya . . . . . . . . . . . . . | 3 miles | | |
| Korea. . . . . . . . . . . . . . | | 20 to 200 miles | Continental Shelf including sovereignty over superjacent waters. |
| Kuwait . . . . . . . . . . . . . | 12 miles | | |
| Lebanon . . . . . . . . . . . . | | 6 miles | |
| Liberia . . . . . . . . . . . . . | 12 miles | | |
| Libya . . . . . . . . . . . . . . | do | | |
| Malagasy Republic . . . . . . . | do | | |
| Malaysia . . . . . . . . . . . . | 3 miles | | |
| Maldive Islands . . . . . . . . | | 6 miles | |
| Malta. . . . . . . . . . . . . . | 3 miles | | |
| Mauritania . . . . . . . . . . . | 12 miles | 12 miles | |
| Mexico . . . . . . . . . . . . . | 9 miles | do | |
| Morocco . . . . . . . . . . . . | 3 miles | do | Exception--6 miles for Strait of Gibraltar. |
| Muscat and Oman . . . . . . . | | | |

(Listing continued on following page.)

Breadth of Territorial Seas and Fishing Jurisdiction Claimed by Members of the United Nations (Contd.)

| Country | Territorial Sea | Fishing Limits | Other |
|---|---|---|---|
| Netherlands | 3 miles | 12 miles[1/] | |
| New Zealand | do | do | |
| Nicaragua | do | 200 miles | Continental Shelf including sovereignty over superjacent waters. |
| Nigeria | 12 miles | | |
| Norway | 4 miles | 12 miles | |
| Pakistan | 12 miles | | Plus right to establish 100-mile conservation zones. Continental Shelf--including sovereignty over superjacent waters. |
| Panama | 200 miles | | |
| Peru | do | 200 miles | |
| Philippines | Archipelago theory | | Waters within straight lines joining appropriate points of outermost islands of the archipelago are considered internal waters; waters between these baselines and the limits described in the Treaty of Paris, Dec. 10, 1898, the United States-Spain Treaty of Nov. 7, 1900, and U. S.-U.K. Treaty of Jan. 2, 1930, are considered to be the territorial sea. |
| Poland | 3 miles | | |
| Portugal | 6 miles | 12 miles[1/] | |
| Romania | 12 miles | | |
| Saudi Arabia | 12 miles | | |
| Senegal | 6 miles | | |
| Sierra Leone | 12 miles | | |
| Singapore | | | |
| Somali Republic | 6 miles | | |
| South Africa | do | 12 miles | |
| Spain | do | do[1/] | |
| Sudan | 12 miles | | |
| Sweden | 4 miles | 12 miles[1/] | |
| Syria | 12 miles | | Plus 6 miles necessary supervision zone. |
| Tanzania | do | | |
| Thailand | do | | |
| Togo | do | | |
| Trinidad and Tobago | 3 miles | | |
| Tunisia | 6 miles | 12 miles | Territorial sea follows the 50-meter isobath for part of the coast (maximum 65 miles). |
| Turkey | 6 miles | do | |
| Ukrainia S.S.R. | 12 miles | | |
| USSR | do | | |
| United Arab Republic | do | | |
| United Kingdom | 3 miles | 12 miles[1/] | |
| Colonies | do | | |
| United States of America | do | 12 miles | |
| Uruguay | 6 miles | 12 miles | |
| Venezuela | 12 miles | | |
| Vietnam | | 20 kilometers | |
| Yemen | 12 miles | | |
| Yugoslavia | 10 miles | | |

1/Parties to the European Fisheries Convention which provides for the right to establish 3 miles exclusive fishing zone seaward of 3-mile territorial sea plus additional 6-mile fishing zone restricted to the convention nations.

Source: National Council on Marine Resources and Engineering Development, January 1, 1968.

# FOREIGN

## CANADA

### BRITISH COLUMBIA FISHERMEN'S 1967 EARNINGS FELL

British Columbia (B. C.) fishermen and vessel owners earned C$49 million in 1967. While value of landings dropped sharply from C$60.6 million in banner year 1966, it was the fourth highest on record.

Salmon production of 133 million pounds was down 18 percent from 163 million pounds in 1966. Due to the larger percentage of higher-priced sockeye taken in 1967, the landed value of salmon was C$36 million, only 7 percent below 1966.

Landings of halibut by Canadian fishermen at B. C. and U. S. ports of 26.2 million pounds were 5.8 million pounds below 1966. Average exvessel prices dropped from 35.8 cents a pound in 1966 to 25.3 cents in 1967; total returns for halibut were C$6.6 million, compared with C$11.5 million in 1966.

Herring Landings Down 75%

Herring landings for 1967 were only 58,000 tons, or about one-quarter the average landings of the past 10 years. They were worth C$1.8 million--compared with C$5.1 million in 1966 and C$6.2 million in 1965.

There had been increased landings of bottomfish (other than halibut) for several years. These culminated in a 1966 catch of over 50 million pounds. But in 1967, production dropped sharply--to 37 million pounds. While part of this decrease was due to market conditions, production problems in the trawling fishery also contributed.

Grey cod production fell from 20.7 million pounds in 1966 to 11.1 million pounds in 1967. Sole landings dropped from 10.5 million to 9.1 million. Other landings, including ocean perch, declined from 14 million to 11.9 million pounds.

Ling Cod Landings Steady

Ling cod landings, including trawl and handline catches, totaled just under five million pounds worth C$462,000. Production has remained relatively constant over the past decade, although unit prices were down somewhat in 1967.

Crab, shrimp, and clam landings all were up in 1967; oyster shucking declined. The total landed value of shellfish reached a record C$2 million in 1967, 11 percent above 1966. ("Fisheries News," Canadian Department of Fisheries, Feb. 15, 1968.)

* * *

### LICENSES LOBSTER FISHERMEN

Canada is licensing lobster fishermen in an attempt to limit fishing effort. This is in addition to a previously announced policy of limiting the number of traps. Boat owners will be required to pay a C$3 registration fee and $2 for a license; each helper will pay $1. Payment is to be made to the Department of Fisheries.

Moreover, vessels must also be registered with the Department of Transport. Registration will enable the Fisheries Department to maintain accurate records on vessels, gear, and employment in the lobster fishery. The new plan is part of an overall program for more efficient management of the fishery to increase earnings of the fishermen. (Canada Dept. of Fisheries, Feb. 6, 1968.)

* * *

### FIRE DESTROYS NEW FISH MEAL PLANT

A new C$500,000 fish meal plant, scheduled to begin operations within 60 days on the former Harmon Field Base at Stephenville, Newfoundland, was destroyed by fire on Feb. 13, 1968. It is rumored that close to $100,000 worth of equipment was saved. The plant was built by a group combining the U. S. firms of Litton and W. R. Grace and financed by the Newfoundland Provincial Government.

Await Decision on Rebuilding

On Feb. 17, Premier Smallwood announced that if a decision is made to rebuild the plant, it can begin operating in 6 months. A Litton representative has already visited Newfoundland; one from W. R. Grace was expected. Presumably, a decision will follow that visit. (U. S. Consul, St. John's, Feb. 19, 1968.)

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# EUROPE

## Norway

FISHING INDUSTRY FACES SEVERE CRISIS

Norway--world's fifth largest fish producer, second largest fish-meal producer, and major exporter to the U. S.--is undergoing what some Norwegians feel is the worst crisis since the 1930s. This despite record landings of 3.1 million metric tons in 1967. Prices, however, fell drastically.

Some industry problems are temporary: low prices domestically, and marketing difficulties abroad--loss of fresh-fish market in U. K. and stockfish market in Nigeria. Other problems are structural: overcapacity of purse-seine fleet and effects of devaluation.

The Government has begun programs to alleviate the most acute temporary problems. Industry difficulties have generated political pressure on Fisheries Minister Oddmund Myklebust.

Modern Fleet's Record Catch

The new catch record was achieved despite restrictions on purse-seine fisheries: herring, capelin, mackerel. These restrictions included stoppages and holidays brought on by 1967 world marketing conditions in fish meal and oil industry.

The production capacity of the modern purse-seine fleet far exceeds the processing capacity of the fish-meal industry. The purse-seiner building boom of 1965, 1966, and 1967 is ended. Only a few are now in order.

Government's Aid Program

Fisheries were the hardest hit export industry following devaluations. Also, the loss of the Nigerian stockfish market caused by political unrest caused inventories to grow alarmingly.

The Norwegian Government is proposing a US$850,000 subsidy to cover devaluation losses. It is extending a US$4 million interest-free loan to cover exporters' stockfish inventories. It has offered the Food and Agriculture Organization 7,000 more tons of stockfish for the World Food Program. And the Government may increase exvessel prices through increased subsidies. (U. S. Embassy, Oslo, Feb. 20, 1968; "Norwegian Fishing and Maritime News," vol. 14, 1967.)

* * *

DEVALUATION HURTS FISHING INDUSTRY MOST

Devaluation has hit the fishing industry hardest of all Norwegian industries. This occurred despite exports in 1967 of more fish and wildlife products than ever before.

Devaluation can be fatal to Norway's already failing exports of fresh fish to the United Kingdom (U.K.) The recent outbreak of hoof-and-mouth disease in the U. K. has improved the frozen fish market for Norway.

Exporters of cod have received no orders for stockfish from Nigeria since devaluation. The exporters say this resulted from the civil war there and from the more favorable situation of Iceland following devaluation.

Devaluation Affects Economy

Throughout Norwegian industry, some firms lost significantly on sales contracts signed before devaluation in devaluated currencies. Some firms have been able to increase prices to cover losses. Although competition and the price squeeze are generally intensified, conditions vary greatly from sector to sector.

Norwegian buyers have not received the advantage of cheaper imports. Many foreign firms in devaluing countries immediately notified Norwegian buyers of price increases on contracts signed in Norwegian kroner--and so took full advantage of devaluation.

Vessel Repair and Maintenance Hurt

Some English importers have ended old ties with Norwegian suppliers because the latter can no longer compete. Several Norwegian producers have not received a single foreign order since devaluation because the British and Danish can offer similar products at lower prices on the world market.

Norway (Contd.):

Norwegian vessel repair and maintenance yards have been hit particularly hard. As for new vessel construction, deliveries of large ships to foreign buyers remain at excellent level, while sales of fishing vessels have dropped.

Exports of large fishing vessels declined from 85 million Norwegian kroner in 1965 to 50 million kroner in 1966--then fell to only 23 million kroner in the first 10 months of 1967. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Feb. 13.)

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## 1967 EXPORTS OF FISHERY PRODUCTS

"Fiskets Gang" reported in January 1968 that Norwegian exports of frozen fillets in 1967 declined about 5 percent from 1966. Shipments of herring and haddock fillets declined significantly. Cod fillet exports were off only slightly at year's end.

Canned fish exports in 1967 were 27,430 metric tons, slightly below 1966 shipments. Exports of small sild sardines were up about 7 percent, but brisling shipments were down 20 percent. The main canning season for brisling and sild sardines begins in spring.

| | Exports | |
|---|---|---|
| | 1967 | 1966 |
| | . . . (Metric Tons) . . . | |
| Frozen fillets: | | |
| Haddock | 10,966 | 14,602 |
| Cod | 25,583 | 26,056 |
| Coalfish | 19,565 | 17,828 |
| Herring | 6,689 | 8,435 |
| Other | 6,298 | 5,875 |
| Total frozen fillets | 69,101 | 72,796 |
| Frozen herring | 13,167 | 16,691 |
| Canned fishery products: | | |
| Brisling | 5,963 | 7,539 |
| Small sild sardines | 13,463 | 12,637 |
| Kippers | 3,348 | 3,386 |
| Shellfish | 523 | 787 |
| Other | 4,133 | 4,539 |
| Total canned fish | 27,430 | 28,888 |
| Fish meal | 494,785 | 257,289 |
| Herring oil, crude | 165,721 | 80,841 |

### Industrial Fish

Exports of fish meal in 1967 were up 92 percent from 1966. Norway maintained the status she gained in 1966 as the world's second largest producer of fish meal. Herring is the main species used for reduction, but mackerel and capelin are also very important.

* * *

## NEW NORWEGIAN GROUP GRANTED EXPORT RIGHTS TO U. S.

Nordic Group A/L, the export organization for 11 (originally 14) frozen fish fillet producers established in fall 1967, has been granted export rights to the U. S. for one year by the Government. The export permit presupposes "positive cooperation" between Nordic and Norsk Frossenfisk A/L (Frionor) in exporting frozen fish fillets to the U. S.

### Frionor Loses Monopoly

The Government's decision has been severely criticized in fisheries circles, particularly by Frionor. This group, naturally enough, wanted to retain exclusive export rights to the important and attractive U. S. market.

Nordic will start operations shortly from its Trondheim headquarters. The individual companies will be permitted to deal directly with their U. S. customers, but all exports will take place in the name of Nordic Group A/L. (U. S. Embassy, Oslo, Feb. 21, 1968.)

# Denmark

## 1967 FISHERY EXPORTS SOARED BUT VALUE SAME AS 1966

In 1967, Denmark exported much larger quantities of fishery products than she did in 1966. But prices were lower and the total value of 885 million kroner (US$118 million) was virtually the same as in 1966. This was reported by the Ministry for Fisheries.

Exclusive of herring oil, 355,000 metric tons of fish products were exported in 1967 against 318,000 tons in 1966.

Herring oil exports nearly doubled: 62,000 tons in 1967--34,000 tons in 1966. These exports prevented the total 1967 export value from declining.

Denmark (Contd.):

Better prices in the U. S. for cod blocks were a favorable development during 1967; European prices for blocks also rose slightly.

Sales of Danish plaice in Europe fell in 1967 because of resistance to higher prices. Prices have now returned to more normal levels, and increased export sales are expected.

Denmark ranks fifth among world's fishery exporting nations by value and fourth by quantity, according to FAO data. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

* * *

INDUSTRIAL FISHERY IS EXCELLENT

Esbjerg's important industrial fishery started out in 1968 by breaking all records. February landings were expected to exceed 25,000 metric tons, three times those of Feb. 1967. Since Nov. 1967, more than 85,000 tons have been landed--compared with only 38,000 tons for the year-earlier period. Despite heavy supplies of fish, there are no plans to impose quotas on the cutters.

Esbjerg's 3 fish meal plants have been expanded within the last year (more expansion is planned). This permits the orderly processing of landings. The cool weather has also helped: the cutters can hold their loads up to 2 days without reducing quality appreciably.

Wait to Unload

Many cutters arriving in the harbor sit extremely low in the water because of heavy loads. Some even have net bags of fish hanging from the rigging. The ship inspection service has warned several skippers to follow the regulations on minimum freeboard.

Prices for industrial fish at the start of the season were up slightly from those at the end of 1967. Larger herring and sprat were bringing about 1.3 U. S. cents a lb. The heavy landings have now brought the price down to 1.2 U. S. cents a lb. for larger herring and sprat. Sea robins, Norway pout, and small herring and sprat are now bringing about 1.1 U. S. cents a lb.

Foreign Competition

The Esbjerg fish meal plants did well financially last year. They should do even better in the wake of last November's devaluation. The plants now pay less for raw material in relation to world price for fish meal. The Norwegians, who did not devalue, are said to be experiencing difficulties in marketing meal and oil.

However, the Danes are not rejoicing greatly over the excellent fishing now underway. They expect the Norwegians also to make heavy industrial catches and to continue effective competition. Also, they are acutely aware of large Peruvian fish meal stocks and of heavy catches there so far this year. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

* * *

FISHERMEN BUY CONTROL OF FISH MEAL PLANT

Several fishing skippers who have delivered catches of industrial fish to the privately owned West Jutland Herring Oil Industry (Vestjydsk Sildolie Industri) early this year urged the firm's director to enlarge the plant. About 50 other skippers are on waiting lists to deliver catches to the 3 large Esbjerg plants. The plants are reluctant to accept more raw material because of inadequate processing capacity.

Expansion to Result from Purchase

The Vestjydsk firm countered with an offer to sell controlling interest to the fishermen. Thirty-eight of the skippers now fishing for the firm decided to accept the offer. This involves the purchase of stock worth nearly \$60,000 over a 3-year period. When payment is completed, more plant capacity costing about \$200,000 will be built. Then the firm should be able to accept industrial fish from more vessels. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1. 1968.)

* * *

FAROESE ORDER MORE FISHING VESSELS FROM NORWAY

A shipowner in Thorshavn, Faroe Islands, has ordered a 166-foot longliner from a

Denmark (Contd.):

shipyard in Ulsteinsvik, Norway. The new vessel will be the largest Faroese longliner. Equipped with a 1,200 hp. diesel motor, it will carry 27 men and have a hold capacity of 500 metric tons of salted fish and 100 tons of frozen fillets. The vessel will be a double-decker and permit the crew to work under shelter. The new vessel, to cost 5.2 million kroner (nearly US$700,000), will be delivered in December 1968.

9 Vessels on Order

Fishing vessels on order for Faroese owners are 3 stern trawlers, 2 longliners, and a purse seiner from Norwegian yards; one longliner and a purse seiner from Faroese yards; and one stern trawler from a West German yard. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, March 1, 1968.)

## West Germany

FISHING INDUSTRY DECLINES SHARPLY

Early this year, the German Federal Republic coastal states of Bremen, Hamburg, Lower Saxony, and Schleswig-Holstein submitted a joint memorandum to the Federal Ministries for Food and Agriculture, Economics and Finance, and to the Bundestag (Parliament) asking financial support to correct critical developments in the fishing industry.

The states reported that the important trawler and lugger fisheries had lost DM7.9 million (4 DM = US$1) in 1965, DM37.5 million in 1966, and were continuing to decline in 1967. This decline was attributed to a drop in demand for fresh white fish of 12 percent in 1966 and 20 percent in 1967. The decline also affected frozen fish sales. As a result, white fish was diverted to fish-meal factories.

States Consider Fishing Essential

The coastal states consider the industry important to the total food supply and essential to Germany's economic policies. It is one mainstay of the states' economy. Though federal and state aid has improved the industry, marketing remains a critical problem; there are no prospects of a solution for the next several years. Therefore, the states believe increased federal aid is indispensable.

State Plans

The state governments propose to divert operations from white fish. They believe 25-30 trawlers and 20-25 luggers will have to be scrapped during the next 2-3 years. They are asking a scrapping premium subsidy of DM12.4 million from the government to prevent bankruptcy of fishing companies. A precedent for such premiums was established during 1961-1967.

The states also suggest that no funds from the revolving loans for vessel construction be granted for vessels designed to land white fish; that repayment terms of federal loans be extended for 2 years; and that federal aid be concentrated to improve marketing. (U. S. Consulate, Bremen, Feb. 23, 1968.)

## Iceland

LIMITATIONS PUT ON HERRING FISHERY

The Icelandic Ministry of Fisheries announced on February 21, 1968, new limitations for 1968 on herring fishing off the south and west coasts. The new rules prohibited herring fishing from March 1 to August 15; limited maximum herring catch to 50,000 metric tons; and increased permissable minimum size of herring caught from 23 centimeters to 25 centimeters (almost 10 inches).

Conservation Measures

The purpose of the new measures is to conserve the south and west coast herring stock. Record catches were made during the mid-1960s. In recent years, many of the herring caught were "immature" fish, particularly during the summer. (U. S. Embassy, Reykjavik, Feb. 29, 1968.)

## Spain

TUNA SEINER "SARASUA" TIED UP

The first trip of the Spanish stern-loading tuna purse seiner "SS Sarasua" was a failure.

Spain (Contd.):

It is attributed to the shipowners' lack of funds to carry out necessary operational changes and equipment adjustments.

The "Sarasua" is now laid up in Huelva awaiting creditors' decisions. (U. S. Consul, Bilbao, Feb. 29, 1968.)

## Netherlands

REPORT ON 1967 FISH MEAL IMPORTS

| | Metric Tons |
|---|---|
| Chile | 18,333 |
| Iceland | 1,039 |
| Norway | 16,116 |
| Peru | 103,879 |
| South Africa | 1,675 |
| Belgium | 334 |
| Denmark | 3,483 |
| Other | 1,001 |
| Total | 145,880 |

## United Kingdom

WHITE FISH AUTHORITY RAISES INTEREST RATES

The interest rates on fishery loans by the White Fish Authority, which became effective Nov. 20, 1967, are:

Loans for fishing vessels, new engines, nets, and gear for not more than 5 years--8 percent (an increase of $\frac{5}{8}$ percent).

More than 5 years but not over 10 years--8 percent (up $\frac{1}{2}$ percent).

More than 10 years but not over 15 years--8 percent (up $\frac{1}{2}$ percent).

More than 15 years but not over 20 years--$7\frac{7}{8}$ percent (up $\frac{3}{8}$ percent).

Loans to Processing Plants

Loans to processing plants for up to 15 years are $8\frac{3}{8}$ percent (an increase of $\frac{5}{8}$ percent).

Loans for over 15 years but less than 20 are $8\frac{1}{4}$ percent (up $\frac{1}{2}$ percent). ("Fishing News," Dec. 8, 1967.)

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DEVELOPMENT PROGRAMS PLANNED

The British Whitefish Authority plans 2 development programs for the fishing industry. It will proceed with these programs with or without Government support.

The programs, which will be emphasized during 1968-69, aim to revive statutory minimum prices (floor prices) and to launch a large-scale campaign to increase fish consumption. The United Kingdom fishing industry had a poor year in 1967--prices, profits and in deaths. ("Fishing News," Mar. 1, 1968.)

## Italy

CANNED TUNA PRODUCTION IS STILL RISING

Canned tuna production in Italy reached 40,000 metric tons in 1967, continuing the upward trend of recent years. The 1967 increase was caused by expanded production of canned tuna in oil to meet increased domestic demand.

Production of other canned fishery products remained unchanged from 1966: anchovies and sardines in oil, 2,500 tons; salted mackerel and anchovies, 2,700 tons; and other fish products 6,000 tons. Industry sources predict further increases in canned tuna output with minor increases in other canned fish products.

To Remain Net Importer

Although the outlook for the fishing industry is promising, and the fleet and shore facilities are being modernized, Italy is likely to remain a net importer of fishery products. Total consumption by 1970 is expected to be about 200,000 metric tons, with imports supplying 30 percent of the total. ("World Fishing," Feb. 1968.)

## Belgium

FISHERY LANDINGS, 1961-67

"Fiskets Gang," published by the Norwegian Fishery Directorate, reports in the Jan. 20, 1968, issue these figures on Belgian landings 1961-67:

| | Total Metric Tons |
|---|---|
| 1967 . . . . . . . . . . . . . . . . | 51,648 |
| 1966 . . . . . . . . . . . . . . . . | 47,305 |
| 1965 . . . . . . . . . . . . . . . . | 48,073 |
| 1964 . . . . . . . . . . . . . . . . | 47,730 |
| 1963 . . . . . . . . . . . . . . . . | 51,678 |
| 1962 . . . . . . . . . . . . . . . . | 47,775 |
| 1961 . . . . . . . . . . . . . . . . | 46,372 |

Note: In 1967, total included 48,524 tons of bottomfish; 1,001 tons of pelagic fish; and 2,123 tons of shellfish.

## Yugoslavia

AIDS CONGO

The state-owned Yugoslav firm "Energoprojekt" will construct 2 fish-processing plants equipped with deep-freezing equipment for the Government of the Republic of Congo. This is in addition to 2 electric power plants. Total aid will be over US$16 million. The cost of the fish-processing plants is not known. ("Tanjug," March 1, 1968.)

## USSR

CONTINENTAL SHELF LAW PASSED

On Feb. 7, 1968, the decree of the Supreme Soviet establishing sovereign rights of the USSR to her territorial Continental Shelf was published. The USSR claims the shelf adjoining her territorial waters (12 miles) to the 200-meters depth. Violations are punishable with fines up to 10,000 rubles (US$11,100) and imprisonment up to 1 year. ("Vedomosti Verkhnogo Soveta SSR," Feb. 7, 1968.)

The new legislation incorporates provisions of the 1958 Geneva Convention on the Continental Shelf into the Soviet penal system. Soviet action comes 4 years after the U. S. passed its Public Law 88-308. The U. S. law prohibits foreign fishing in U. S. territorial waters and declares that the resources of the Continental Shelf belong to the United States.

Japanese Reaction to Soviet Action

The Japanese newspaper "Nihon Suisan Shimbun" stated on Feb. 21, 1968, that Japan has no international obligation to respect the Soviet announcement because Japan did not sign the 1958 Geneva Convention. However, Japanese fishery companies fear the Soviet proclamation may adversely affect their king crab fishery in the Sea of Okhotsk and tanner crab fishery off the Kamchatka Peninsula.

A few days later, both Foreign Ministry and Fisheries Agency officials reiterated Japan's position that king crabs are not sedentary creatures of the Continental Shelf, and so are not covered by the Soviet law. Also, Japan does not consider herself bound by the Soviet declaration of authority over minerals and sedentary marine creatures of the Continental Shelf off the Soviet coasts because Japan did not sign the 1958 Convention.

* * *

BUYS FROZEN FISH FROM BRITISH

A contract to supply frozen fish to the Soviet Union has been awarded British Limited, a frozen fish exporting cooperative of the Grimsby and Hull fishing ports. The value of the contract (£460,000 or US$1.1 million) is 50 percent greater than a similar one in 1967. The British hope other export orders may be obtained during the year. There was fierce competition from other European fish-exporting countries. ("World Fishing," Feb. 1968.)

The species of fish and quantities were not given. Traditionally, the Soviets buy frozen cod and herring, mostly from Iceland.

In 1966, the Soviets produced only 160,700 metric tons of frozen fishery products. Although this was considerably more than 1960's 57,400 tons, apparently it was not enough to satisfy rapidly expanding domestic demand.

* * *

USSR (Contd.):

RESEARCH IN EQUATORIAL ATLANTIC ENDS

Two ATLANTNIRO fishery research vessels carried out exploratory studies in the Congo-Angola portion of the west African Continental Shelf and have returned to Kaliningrad. The expedition discovered new fishing grounds and determined that a snapper fishery could be profitably started. Soviet scientists estimate that up to 40 metric tons of snappers a day could be caught by large stern factory trawlers off Congo and Angola. Concentrations of large shrimp and squid also were discovered.

* * *

FISHING ATLAS PUBLISHED

The Polar Institute for Fisheries and Oceanography at Murmansk has published a Fishing Atlas of the White Sea containing 50 colored charts describing the effect of hydrological conditions on seasonal distribution of White Sea fish.

The Leningrad section of the Soviet Oceanographic Institute has drafted about 300 maps depicting hydrometerological and fishing data for the Caribbean Sea and the Gulf of Mexico.

# MID EAST

## Cyprus

PROSPECTS FOR A FISHING INDUSTRY

Despite Cyprus' natural geographic advantages, it must import 2,000 metric tons of fish every year. The local industry provides only 1,000 tons of fresh fish annually. The Government, trying to find substitute for imports, is more active now in promoting and expanding local production.

The meager production is attributable to several factors: lack of capital and training in the industry, overfishing, dynamiting, indiscriminate use of trawler nets, and possibly the deficiency of fish in coastal waters. However, recent studies showed many fish can be caught using proper measures.

Government Helps

In 1965, the Department of Fisheries in the Ministry of Agriculture and Natural Resources was established. This year, a Preventive Service was organized to curb unlawful fishing. The Government hopes to enact a new law this year regulating and policing the industry. US$120,000 is now available for loans to fishermen in inshore fishing to buy vessels, machinery, echo-sounders, and other devices required to develop the industry.

The Fisheries Department will conduct 1-month courses this year in maintenance of nautical machinery, making and repairing nets, and use of echo-sounders. It is now offering a 20-percent subsidy to buy echo-sounders. To encourage fishing in international waters, special subsidies will be given to trawlers that operate beyond Cyprus' inshore area.

FAO Helps

An FAO expert has been working with the Fisheries Department since September 1967 studying the feasibility of expanding pelagic fishing. The initial results are encouraging. Cyprus plans to buy its own research vessel this year to conduct biological and oceanographic investigations and to be a training center for fishermen. The Government is stocking, experimentally, 8 dams with freshwater fish. (U. S. Embassy, Nicosia, Feb. 28, 1968.)

# LATIN AMERICA

## Mexico

### 1967 CATCH ROSE 13 PERCENT ABOVE 1966's

Mexico's 1967 landings of fishery products were 233,274 metric tons--13 percent higher than 1966's 218,757 tons, according to preliminary figures. Several important food-fish species showed substantial gains. Shrimp continued to gain, and sardines and anchovies showed large gains. Nearly all sardines and anchovies are landed in Baja California and are canned as "sardines." The spiny lobster catch broke all records. Giant sea bass and grouper catches fell.

The output of industrial fishery products leveled off.

| | 1967 | 1966 | Percentage + or - from 1966 |
|---|---|---|---|
| | (1,000 Metric Tons) | | |
| Edible fish & shellfish | 197.5 | 171.5 | +15 |
| Shrimp . . . . . . . | 42.6 | 39.7 | + 7 |
| Sardines . . . . . . | 29.6 | 18.7 | +58 |
| Anchovy . . . . . . | 22.8 | 13.7 | +66 |
| Lobster, spiny . . . | 1.6 | 1.4 | +13 |
| Mackerel . . . . . . | 6.0 | 5.3 | +14 |
| Sea bass-grouper . . | 4.6 | 7.7 | -40 |
| Oysters . . . . . . . | 19.7 | 19.9 | - 1 |
| Abalone . . . . . . | 2.7 | 2.8 | - 3 |
| Fish meal production | 10.2 | 9.6 | + 6 |
| Kelp (landed) . . . . | 20.1 | 22.1 | - 9 |

Note: As landed or as first sold--heads on, heads off, dressed, round, shucked, dried, salted, or processed as in the case of fish meal.

#### Good Shrimp Year

The increase in shrimp catch, plus high prices during first-half 1967, resulted in a profitable year for exporters. Shrimp exports totaled US$64.1 million, up 22 percent from 1966. Shrimp maintained fourth place among all exports, led by corn, cotton, and sugar.

Most shrimp went to the U. S., but Japanese sources say 7,995 tons worth US$19.4 million went to Japan--through U. S. dealers.

#### Pacific Fishery Collapses

In Dec. 1967, the shrimp fishery collapsed on the Pacific Coast. Fishing was extremely poor in February 1968, and catches at the end of January were less than one percent the Jan. 1966 or 1967 level. However, catches have been holding up well on the Gulf coast.

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### NATIONALIZATION OF FISHING INDUSTRY

Commercial Fisheries Review reported in January 1968 that Mexico's National Bank for the Development of Cooperatives (BANFOCO) had bought in October 1967 the 8 fishery companies known collectively as Empresas Rodriguez. It became the largest producer of canned fish. The bank bought all shares owned by the Rodriguez family and privately held shares of company officials. All officers were retained on salaries, so the companies continue to operate effectively with no change in policy.

These are the companies:

Pesquera del Pacifico, S. A., at El Sauzal, about 5 miles from Ensenada. This plant is the largest individual cannery in Mexico. It has separate lines for tuna, sardines, mackerel, anchovies, tomato products, refried beans, peaches, fruit juice, and canned pet food. It also includes a large fish-meal plant that uses waste from fish-canning operations, plus whole anchovies. Nearly all products are for the domestic market.

Pesquera Peninsular, S. A., in Ensenada, cans sardines, mackerel, and anchovies. Recently it began to can sea mussels. Its fish meal and stickwater plant use waste from the cannery; it also receives offal from all independent canneries in Ensenada. All products are marketed in Mexico.

Pesquera Isla de Cedros, S. A., a cannery on the island of the same name. It packs anchovies, sardines, and mackerel for the domestic market; it cans abalone for export. It produces fish meal from cannery offal. The sale of this plant included 6 small purse-seine vessels: "Agustin II," "Captain Tsekus," "Portola," "San Martin," "San Rafael," and "Tito."

Pesquera de Bahia Tortugas, S. A., on the bay of that name in the Territory of Baja California Sur. It cans abalone for export.

Mexico (Contd.):

Pesquera Matancitas, S.A., a combination sardine cannery and fish-meal plant, on Bahia Magdalena in the Territory. It cans sardines and uses both cannery offal and whole fish to produce fish meal. It includes a largely unused freezing plant. The sale included 2 small purse-seine vessels: "Mexicano," and "Californiano." A third boat that fishes for matancitas ("moon beam") is privately owned.

Astilleros Rodriguez, S.A., the boat-building and repair yard in Ensenada.

Pesquero Santa Isabel, S.A., in Ensenada, operates the 3 tuna purse seiners supplying Pesquera del Pacifico (tonnage capacities in parentheses): "Santa Isabel" (220), "Tesoro del Mar" (200), and "Princesa" (175).

Atun Mex, S. de R. L., in Ensenada, formerly operated both the tuna and sardine fleets, but Santa Isabel was split off to handle the tuna vessels. Atun Mex now has only the sardine purse seiners that supply Pacifico and Peninsular. Several privately owned boats also deliver to these canneries. The 6 refrigerated vessels fish for sardines, anchovies, mackerel, and bonito--and for tuna during local runs. The vessels, with tonnage capacities in parentheses: "San Juan" (150), "Santa Maria" (135), "San Pedro" (120), "Stella Maris" (100), "Aida" (90), and "Marino II" (90).

All vessels in the 4 BANFOCO fleets were built in the U. S. They used to fish out of California ports. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Mar. 3, 1968.)

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### 1967 LANDINGS ROSE AT PILOT FISHING PORT OF ALVARADO

Although still operating far below capacity, landings and production at the pilot fishing port of Alvarado, Veracruz, have improved.

| | 1967 | | 1966 | |
|---|---|---|---|---|
| | Metric Tons | US$ 1,000 | Metric Tons | US$ 1,000 |
| Landings: | | | | |
| Shrimp . . . . . | 273.0 | 457 | 225.5 | 309 |
| Octopus . . . . | 430.0 | 103 | 471.0 | 104 |
| Finfish . . . . . | 2,081.0 | 170 | 1,446.0 | 170 |
| Production: | | | | |
| Fish meal . . . . | 90.0 | 14 | 83.0 | 13 |
| Canned fish . . . | 1/ | 282 | 1/ | 272 |

1/Not available.

Since it opened in 1964, the port has fallen short of expectations. The present management, however, is striving to increase landings and production, particularly by building large shrimp trawlers.

At the end of 1967, 15 vessels were operating from the port; 14 were under construction in local shipyards; 15 were being built in other shipyards. There were 240 persons employed ashore.

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### JAPAN-MEXICO 12-MILE FISHING ZONE TALKS RESUME

The second round of talks between Japan and Mexico to permit Japanese fishing inside Mexico's 12-mile exclusive fishery zone opened in Tokyo, Japan, on Jan. 22, 1968. The Japanese outlook is that an agreement will be reached. ("Suisancho Nippo," Jan. 17, 1968.)

## Peru

### ANCHOVY FISHING SEASON REOPENS

Anchovy fishing in Peru recommenced on March 18, after a closed season ("veda") that began Feb. 17.

Fish-meal production during Jan. 1-Feb. 15 was 447,410 metric tons; shipments during same period were 285,007 metric tons.

Stocks on hand, as of Feb. 15, were 758,107 tons; 115 plants were in production. Mid-March stocks were estimated at 600,000 tons. (U. S. Embassy, Lima, March 19.)

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### FISH MEAL PRODUCTION AND HOLDINGS

Peruvian fish meal stocks on Jan. 31, 1968, were the highest ever; 1967 production also set a record.

| | 1968 | 1967 | 1966 | 1965 |
|---|---|---|---|---|
| | (Metric Tons) | | | |
| Fish meal production: | | | | |
| Total for year | - | 1,815,983 | 1,470,478 | 1,282,011 |
| January . . . | 287,466 | 242,380 | 194,104 | 164,899 |
| Stocks held on Jan. 31 . . . | 688,943 | 600,340 | 375,165 | 237,443 |

Source: "Sociedad Nacional de Pesquera," Feb. 21, 1968.

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Peru (Contd.):

## FISH-MEAL PRODUCERS APPEAL TO GOVERNMENT

The Association of Small and Medium Fish-Meal Producers has written the Ministry of Agriculture, which is responsible for fisheries, complaining that low fish-meal prices and lack of capital have forced many of its plants to close. The letter says that unless the situation improves, many plants will close for good.

Conveyor belt carrying anchovies into fish meal plant for processing. (Photo: M. J. Lindner)

Among the causes cited was Decree 77 of December 9, 1967; this prevents "free commercialization" of fish meal. The Association claims that the decree favors Peru's competitors: it creates an artificial saturation of the market and forces Peru to maintain enormous stocks of fish meal, which adversely affect prices.

### What Association Asks

The Association asked that Decree 77 be modified to make the marketing machinery voluntary, not obligatory. The Ministry was asked also to enforce the anchoveta catch limit of 8 million metric tons, to speed paperwork involved in getting fish meal shipped, and to transfer the responsibility for recording fish-meal exports from the National Fisheries Society (SNP) to the Ministry. ("Pesca," Dec. 1967.)

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## CONSULTANTS RECOMMEND HAKE INDUSTRY TO GOVERNMENT

A Spanish consulting firm, "Techniberia," has recommended to the Peruvian Government that it set up a hake catching and distribution operation. The recommendation followed the firm's study of the fishing industry and fish resources.

### Firm's Thoughts

Techniberia observed: (1) There is little chance of a dramatic increase in catch of currently desired species--mullet, sea bass, and others--because they are relative scarce; (2) Prospects for large-scale marketing of fish are more favorable for frozen than for fresh products; (3) Large-scale sales of frozen hake would not conflict with sales of fresh fish; and (4) It would be necessary to set up a complete new system for catching and marketing hake.

The group recommends trawlers 80-85 feet long, with a capacity of 50-60 tons, equipped to trawl at depths greater than now fished. It recommends also construction of freezing plants. The system could be operational within 18 months. ("Pesca," Dec. 1967.)

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## SHIPYARD BUILDS 6 LARGE PURSE SEINERS

The firm Maestranzas y Astilleros Delta, S.A., in Callao, is building 6 large purse seiners for Fabrica de Conservas Neptuno, a fish-meal plant in Chimbote.

The wood vessels are 95 feet long, can hold 350 tons, and will cost US$165,000.

The vessels were scheduled to be delivered in March ready to fish. Orders for similar vessels are pending from Pesquera Amazonas, Pesquera Trinidad, and Pesquera Taybe. ("Pesca," Dec. 1967.)

# ASIA

## Japan

### FISHERIES DIRECTOR OUTLINES POSITIONS AND PLANS

On Feb. 13, 1968, the Director of the Japanese Fisheries Agency addressed a meeting of Chiefs of Fishery Departments (Prefectures). The following are highlights of his talk:

• Development of New Fishing Grounds: The Fisheries Agency will undertake a large-scale survey to develop new fishing grounds.

• Fishery Financing: To modernize the industry, the Agency will study the status of fishery financing and use of the Fishery Cooperative Associations' funds.

• Abolition of Fish Price Stabilization Fund: Since a bill to abolish the fund is due to be brought before the Diet, the Agency is studying other measures to stabilize prices.

• Partial Revision of Ships Safety Law: Ratification of the International Treaty on Full Draft of 1966 and a bill to partially revise the domestic Ships Safety Law--will be brought before the Diet. When revised, fishing vessels of more than 20 tons will have to identify their full draft line, and loading will be restricted. To prevent hardships, the Agency will give reasonable notice before enforcing the revisions.

• Establishing Operational Order in World Fishing Areas: Other countries are moving progressively to establish fishing zones. Japan's basic position is: (1) coastal countries can only claim a discriminatory right for control over their own territorial waters; (2) unilateral establishment of fishing zones is not valid under international law; (3) establishment of fishing zones is valid only by agreement between countries involved.

The Japan-New Zealand Agreement concluded last year is based on this position. It will be ratified by the Diet. Also, the Agency will request the Diet to approve Japan's participation in the Treaty Concerning Territorial Waters and Adjacent Waters, and in the Treaty Concerning the High Seas. ("Suisan Tsushin," Feb. 14, 1968.)

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### 1967 TUNA EXPORTS DROPPED 60 PERCENT

Customs data reveal that Japan's exports of frozen tuna in 1967 were only 117,914 metric tons--60 percent of 1966's 195,054 tons. The value of US$45,000,000 in 1967 was only 55 percent of the $81,000,000 in 1966.

Principal Markets by Species

| | Albacore | Yellowfin | Skipjack | Bluefin | Other | Total |
|---|---|---|---|---|---|---|
| | (Metric Tons) | | | | | |
| United States. | 19,979 | 10,337 | 225 | - | 115 | 30,656 |
| Puerto Rico . | 14,503 | 11,507 | 3,815 | - | 572 | 30,397 |
| Am. Samoa . | 8,052 | 1,341 | 4 | - | 1,433 | 10,830 |
| Fiji . . . . . | 2,791 | 506 | - | - | 707 | 4,004 |
| Malaysia . . . | 1,422 | 314 | - | 4 | 125 | 1,865 |
| New Hebrides. | 557 | 137 | 43 | - | 226 | 963 |
| Canada. . . . | 1,081 | 278 | - | - | - | 1,359 |
| France . . . . | 309 | - | - | - | - | 309 |
| Italy . . . . . | 61 | 27,710 | 625 | 778 | 3,286 | 32,460 |
| Spain. . . . . | - | - | 511 | - | 11 | 522 |
| Portugal . . . | - | - | 271 | - | 29 | 300 |
| Guyana . . . | - | 206 | 471 | - | 122 | 799 |
| Canary Is. . . | - | 18 | 1,000 | - | 34 | 1,052 |
| Denmark. . . | 55 | - | - | - | 598 | 653 |
| Ivory Coast. . | - | 55 | 347 | 75 | 3 | 480 |

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### SLUMP IN FROZEN TUNA EXPORTS CUTS INSPECTION REVENUE

The Japan Frozen Foods Inspection Corp., commissioned by the Government to inspect export frozen fishery products, faces financial difficulties. The situation was caused by a substantial reduction in inspection revenue during 1967 as frozen tuna exports declined sharply.

In 1967, these exports declined about 50,000 metric tons from 1966. Revenue was cut over US$139,000. The Corporation had to reduce its overseas inspection staffs in Italy, Long Beach, Calif., and American Samoa.

#### Corporation Fees

The Corporation conducts mandatory inspection of fresh and frozen tuna for export at a fee of 1.3 yen a kilogram ($3.97 a short ton) for albacore, 1.1 yen per kilogram ($3.36 a short ton) for yellowfin, and 0.95 yen a kilogram ($2.90 a short ton) for other tuna species. ("Suisan Nippo," Feb. 26, 1968, and other sources.)

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Japan (Contd.):

## LOSING LEAD IN U. S. FROZEN TUNA EXPORT MARKET

A recent Japanese study reveals that frozen tuna exports to the U. S. in 1967 fell below the combined quantity exported to the U. S. by South Korea, Taiwan, and others. Japan exported an estimated 70,000 short tons to the U. S.; the others, 71,000. While 1967 was extremely sluggish for Japanese frozen tuna exports, South Korean and Taiwanese exports to American Samoa and Puerto Rico increased sharply; the uptrend is likely to continue.

### Japan Being Undersold

Moreover, Japan is faced with price problems: reportedly, South Korea and Taiwan are exporting tuna to Puerto Rico at prices \$10-20 a ton below Japanese prices. Those countries are gaining greater control of the U. S. frozen tuna export market--in quantity and price. ("Suisan Tsushin," Feb. 10, 1968.)

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## CUTS TUNA EXPORT QUOTAS TO U. S.

On Feb. 9, 1968, the Japan Frozen Tuna Exporters Association proposed export quotas of frozen tuna to the U. S. for fiscal year 1968 (April 1968-March 1969). The FY 1968 quotas are much below FY 1967's. The proposed quotas were to be presented for approval to the directors' meeting, scheduled for Feb. 21. ("Suisancho Nippo," Feb. 12, 1968.)

New quotas:

| | Fiscal Year | |
|---|---|---|
| | 1968 | 1967 |
| | . . (Short Tons) . . | |
| To United States | | |
| (a) Shipments from Japan: | | |
| Albacore | 30,000 | 35,000 |
| Yellowfin | 25,000 | 35,000 |
| Loins | 6,000 | 8,000 |
| Additional quota: | | |
| Albacore & yellowfin | 10,000 | 10,000 |
| Loins | 2,000 | - |
| (b) Transshipments from Indian Ocean: | | |
| Albacore & yellowfin | 4,000 | 4,000 |
| (c) Transshipments from Atlantic Ocean: | | |
| Albacore | 20,000 | 25,000 |
| Additional quota | 5,000 | 5,000 |
| To Fishing Bases | 4,000 | 4,000 |
| To Italy | 45,000 | 45,000 |

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## EXPORT PRICES OF FROZEN TUNA FOR U. S.

Japanese export prices of frozen tuna for the U. S. in January 1968 were:

| | Prod. | Low | High | Average |
|---|---|---|---|---|
| | | . (In US\$/Short Ton f.o.b. Japan) . | | |
| Albacore | rnd. | 436<br>(420) | 470<br>(505) | 447<br>(496) |
| Yellowfin | g. & g. | 400<br>(410) | 413<br>(460) | 402<br>(440) |
| Albacore | loins | -<br>(1,056) | -<br>(1,062) | 1/985<br>(1,060) |
| Yellowfin | loins | 830<br>(970) | 876<br>(1,000) | 855<br>(979) |

1/Only one shipment in Jan. 1968.
Note: Figures in parens are those for Jan. 1967.

(Fisheries Attaché, U. S. Embassy, Tokyo, Feb. 7, 1968.)

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## EXPORTS OF MARINE PRODUCTS DECLINED IN 1967

Japan's exports of marine products in 1967 were worth US\$325,578,000 on a customs-clearance basis, down 9.1 percent from 1966 exports of \$358,073,000. This is the first time such exports have declined since Japan recovered her international trade after World War II.

| Value of 1967 Marine Product Exports | | |
|---|---|---|
| | 1967 | 1966 |
| | . . . . (US\$1,000) . . . . | |
| Canned & bottled products | 163,011 | 148,138 |
| Frozen fishery products | 82,923 | 118,365 |
| Pearls | 55,037 | 64,697 |
| Fish oils | 9,164 | 12,527 |
| Salted/dried products | 5,658 | 5,192 |
| Agar-agar | 4,228 | 2,621 |
| Fish meal | 1,769 | 2,619 |
| Nonedible shellfish | 1,249 | 1,200 |
| Seaweed products | 1,102 | 1,187 |
| Dried skipjack loins | 806 | 1,110 |
| Live fish and shellfish | 631 | 417 |
| Total | 325,578 | 358,073 |

### Changing World of Fishing

The decline was ascribed primarily to growing world restrictions on the harvest of fishery resources--and the remarkable advance in fishery production by developing nations. Another factor is growing domestic demand in Japan for high-priced fish. In 1967, this put frozen fish products, such as tuna, in short supply for export. As a result of these developments, frozen tuna exports in 1967 declined about 45 percent in value.

Japan (Contd.):

Other exports that declined markedly were pearls, fish oils, and meal.

On the other hand, canned mackerel and canned salmon gained. ("Suisan Keizai Shimbun," Feb. 13, 1968.)

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## 1967 CANNED JACK MACKEREL EXPORTS

Japanese canned jack mackerel exports in 1967 totaled 5.07 million actual cases (1 lb. tall 48's and $\frac{1}{2}$-lb. 48's) on a customs-clearance basis. Two-thirds of the exports went to the Philippine Islands. Exports to Malaysia and New Guinea also showed gains, but sales to the U. S. fell by over 60 percent from 1966 figures. ("Suisan Tsushin," Feb. 13, 1968.)

| Principal Destination | 1967 | | 1966 | |
|---|---|---|---|---|
| | Natural1/ | Others2/ | Natural1/ | Others2/ |
| | . . . . . (Number of Actual Cases) . . . . . | | | |
| Philippines. . . | 966,337 | 2,416,737 | 663,010 | 1,276,945 |
| Malaysia. . . . | 503 | 357,442 | 21,222 | 226,982 |
| United States . | 171,729 | 10,379 | 425,116 | 44,169 |
| New Guinea . . | 151,736 | 14,510 | 71,401 | 11,221 |
| Others . . . . . | 378,759 | 606,916 | 333,516 | 515,169 |
| Total. . . . | 1,669,064 | 3,405,984 | 1,514,265 | 2,074,486 |

1/Converted to 1-lb. tall cans, 48 cans per case.
2/Converted to $\frac{1}{2}$-lb. cans, 48 cans per case.

* * *

## REPORT ON HERRING ROE IMPORTS, PRODUCTION, PRICES

Table 1 - Imports

| From | 1967 | 1966 | 1965 | 1964 | 1963 |
|---|---|---|---|---|---|
| | . . . . . . . (Metric Tons) . . . . . . . | | | | |
| U. S. . . . . . . . | 294 | 313 | 218 | 52 | 57 |
| Canada . . . . . . | 17 | 12 | 6 | 10 | 8 |
| USSR . . . . . . . | 97 | 113 | 49 | - | - |
| Norway . . . . . . | 21 | 51 | 8 | 5 | 14 |
| North Korea . . . . | - | 15 | - | - | - |
| Netherlands . . . . | 1 | - | - | - | - |
| Total. . . . . . | 430 | 504 | 281 | 67 | 79 |

Source: Customs Clearance Statistics.

Table 2 - Production

| | 1967 | 1966 | 1965 | 1964 | 1963 |
|---|---|---|---|---|---|
| | . . . . . . . (Metric Tons) . . . . . . . | | | | |
| Dried. . . . . . . . | 1/ | 52 | 55 | 79 | 326 |
| Salted . . . . . . . | 1/ | 1,089 | 641 | 508 | 508 |
| Total . . . . . . | 1/ | 1,141 | 696 | 587 | 834 |

1/Not available.
Source: Japan Fisheries Agency.

Table 3 - Tokyo Average Wholesale Price

| | Price1/ | |
|---|---|---|
| | Yen/Kilo | US$/lb. |
| 1967. . . . . . . . . . . . . . | 2,300 | 2.90 |
| 1966. . . . . . . . . . . . . . | 2,100 | 2.65 |
| 1965. . . . . . . . . . . . . . | 3,200 | 4.04 |

1/For "large" roe, 10-13 cm. in length and 23-35 grams in weight.
Source: Japan Fisheries Agency.

* * *

## TO EXPLORE OFF U. S. EAST COAST AND GULF OF MEXICO

The firm Nihon Suisan plans to send an expedition to the U. S. east coast and the Gulf of Mexico this year. In May 1967, it sent the stern trawler "Kaimon Maru," 2,500 gross tons, to the U. S. east coast on a 2-month exploratory cruise. The purpose is to develop new bottomfish grounds for the firm's trawlers now operating off West Africa. There, the fishery is becoming unstable.

### The 1968 Plan

For the 1968 trip, Nihon Suisan plans to operate a 2,500- to 4,000-ton vessel. The craft will survey the Atlantic coast of North America south of the area scheduled for investigation this year by the Government research vessel "Kaiyo Maru" (3,500 gross tons). The vessel also will survey the offshore waters of the Gulf of Mexico where Japan has done relatively little exploration.

In the 1967 expedition, the firm lost about US$111,000, but the cruise resulted in the catch of interesting species--such as herring, butterfish, and red snappers. ("Shin Suisan Shimbun Sokuho," Feb. 20, 1968.)

* * *

## ENDS EXPLORATORY TRAWLING OFF CHILE

The Nitto Hogei Fishing Co., which had been trawling experimentally for hake, shrimp, and other bottomfish off Chile since early Nov. 1967, ceased in early Feb. 1968. Its two 300-ton trawlers and one 7,477-ton freezership departed for Japan.

The firm had planned to fish until April 1968 in a preliminary resource study prior to joining with Chilean interests.

Japan (Contd.):

Apparently, the survey results were not satisfactory. ("Shin Suisan Shimbun Sokuho," Feb. 23, 1968.)

* * *

## FIRM INTERESTED IN FISHING GREENLAND BOTTOMFISH

The Japanese firm Nihon Suisan is showing interest in fishing bottomfish in the Davis and Denmark Straits off the east and west coasts of Greenland. The firm hopes to survey those areas in summer 1968 with its trawler now operating off West Africa.

The two straits, never fished by the Japanese, were worked successfully by the Soviets in 1967. Nihon Suisan's exploration of the region's commercial potential would be in line with its plan to establish a year-round trawl fishery in the Atlantic Ocean.

### Government Also Plans Cruise

Besides Nihon Suisan's proposed expedition, the Government has scheduled an exploratory cruise to the northwest Atlantic off Newfoundland in 1968 by its year-old 3,200-gross-ton research vessel "Kaiyo Maru."

The area farther south of Newfoundland, or south of 42° N. latitude off New York, was surveyed in 1967 by the research vessel "Kaimon Maru" (2,500 gross tons) with some success. ("Shin Suisan Shimbun Sokuho," Feb. 6, 1968.)

* * *

## GOVERNMENT TO PERMIT ONLY TRIAL SEINING ON DISTANT GROUNDS

The Japanese Fisheries Agency has been deliberating whether to license purse seining in the Atlantic Ocean off West Africa and in the South Pacific Ocean on a full commercial scale. It has decided tentatively to continue permitting only experimental operations. The prevailing view within the Agency is that purse seining in distant waters and its effect on resources are still questionable. Therefore, more study is needed.

### Present Fleet

At present, Nichiro Fishing Co. operates a fleet of 4 two-boat seiners and 2 motherships in the West African fishery. It is reported, however, that several firms, including Nichiro, have filed license applications for a total of 40 purse-seine units to operate off West Africa. Attention is focused on how many of those vessels the Agency will permit in the eastern Atlantic fishery. ("Katsuomaguro Tsushin," Feb. 7, 1968.)

* * *

## SKIPJACK TUNA SEINING TESTED OFF NEW GUINEA

Taiyo Gyogyo K. K., which has had many tuna seiners in Sanriku waters, now has the 275-ton "No. 3 Hayabusa Maru" there. The firm recently used this vessel to test fish for skipjack in tropical waters north of eastern New Guinea during the Sanriku offseason. The seiner left Nagasaki on Dec. 18, 1967, and returned Jan. 25, 1968. During the test, 49 metric tons (mainly skipjack) were caught, not a large catch. However, the operation was only a test and the usual gear for the Sanriku operation was used.

### Fit Vessel To Skipjack

Technicians of the firm's Nagasaki branch were aboard. They said there would be good prospects for this fishery if the vessel's construction, rigging, gear, and methods were improved to fit the habits of the local skipjack. The vessel's catch was erratic: one haul would take 16.5 tons and the next only a few tons.

It has long been said that there is no difference in temperature between surface and deep water off New Guinea. The water is very clear and makes fishing difficult. (Japanese Fisheries News Report, Feb. 14, 1968.)

* * *

## RESEARCH VESSEL RETURNS FROM NORTH PACIFIC

On Feb. 15, the Japanese Government-owned research vessel "Kaiyo Maru" (3,210 gross tons) returned to Tokyo after a 15-day exploratory cruise in the North Pacific Ocean. The surveys were conducted west of 160° E. longitude and south of 45° N. latitude, or within Area B under the Japan-USSR Fisheries Treaty.

Japan (Contd.):

### Cruise Objectives

Objectives were to learn more about the biology of salmon wintering in the North Pacific Ocean, and to test efficiency of vessel's navigational and fishing instruments in cold weather.

It was established that, even in February, the salmon near $160^{\circ}$ E. longitude dwell in waters of $3^{\circ}$-$6^{\circ}$ C. ($37.4^{\circ}$-$42.8^{\circ}$ F.). Before, it was believed they wintered in warmer temperature zones. There were strong indications that pink salmon were recovering this year, a lean one for the species. ("Suisan Keizai Shimbun," Feb. 19, 1968.)

* * *

## TO TIGHTEN RULE ON FOREIGN VESSEL ENTRY INTO 3-MILE ZONE

The Japanese Fisheries Agency wants to prohibit foreign vessels from fishing within the three-mile territorial sea. It plans to strengthen application of the October 1967 Fisheries Law governing fishing by foreign nationals.

Recently, more Soviet and South Korean vessels have been sighted passing through Japanese waters with fishing gear on deck or otter trawl boards towed behind. It has been difficult to determine whether these transits were innocent or attempts to fish stealthily.

### Innocent Passage

While the Fisheries Law does not restrict innocent passage, the Agency intends to recognize passage as innocent only if the vessel is not ready to fish. Therefore, it plans to instruct coastal patrol officers to warn transiting foreign fishing vessels in Japanese territorial waters to stow their gear--or move out of these waters. ("Suisan Keizai Shimbun," Feb. 15, 1968.)

* * *

## SAFETY PRECAUTIONS TIGHTENED IN JAPAN SEA

The Japanese Government has advised all her fishing vessels in the Japan Sea to observe strictly the safe navigation rules in the Maritime Accident Prevention Law. The Government acted as tension heightened following North Korea's seizure of the U. S. naval vessel "Pueblo."

One crab fishing vessel reported the loss of gear caused by the passage of a huge foreign naval ship; some fishermen claim their vessels were surrounded by foreign patrol boats.

### The Precautions

Fishing vessels in the Japan Sea (over 6,350 craft) have been cautioned to display clearly the national flag, refrain from approaching foreign naval vessels, and to avoid South Korea's exclusive fishing zone. The Government also has asked the U. S., the Soview Union, and South Korea to consider the safety of Japanese vessels. ("Minato Shimbun," Feb. 10, 1968.)

* * *

## URGES TALKS WITH SPAIN ON 12-MILE FISHING LIMIT

The Japanese trawl industry is urging the Government to negotiate with Spain as soon as possible to safeguard Japanese vessels fishing off Spanish Sahara. Spain extended her exclusive fishing limit to 12 miles in May 1967. Recently, she strengthened enforcement and reportedly seized 14 foreign fishing vessels, including a Japanese trawler, since Dec. 28, 1967.

### Japanese Seriously Affected

Japanese trawlers had fished for squid and octopus in productive grounds 6 to 8 miles off the Sahara coast for 9 years until Spain proclaimed the 12-mile limit. The trawlers are now seriously affected by the new law's rigid enforcement. ("Suisan Keizai Shimbun," Feb. 20, 1968, and other sources.)

* * *

## HOW JAPANESE PROCESS TANNER CRAB

Most of the zuwai-gani (tanner crab, Chionoecets apilio) taken in the factoryships is frozen. This avoids the costly problem of removing the meat from the shell.

The carapace of the raw crab is removed by hooking the shell over the sharp edge of a removing tool. The body then is broken

Japan (Contd.):

into 2 sets of legs (right and left); any viscera, etc., adhering to the leg is removed by washing. The sets of legs are frozen, packaged, and marketed.

Canned

Zuwai-gani is canned by the same method used for king crab. There are 2 variations used by industry:

| Single Cooking | Double Cooking |
|---|---|
| Raw Crab | Raw crab |
| Remove carapace | Remove carapace |
| Cook (100° C. or 212° F.; 15-18 min.) | Cook (60°-70° C. or 140°-158° F.; 10 min.) |
| Cool (sea water) | Separate legs |
| Separate legs | Extract meat |
| Extract | Cook (100° C.; 10-15 min.) |
| Can | Can |

The double-cooking method apparently is used more commonly in the U. S. The Japanese prefer the single-cooking method because the product has a better flavor and a firmer pack.

Meat usually is extracted by hand. The legs are cut in short segments and the meat shaken or pushed out. Frequently, the shell segment will have to be opened by scissors to extract the meat.

The legs of the zuwai-gani are smaller than the king crab's and the meat difficult to remove. The labor for picking zuwai-gani is reported to be 6 times that for king crab. That is why almost all zuwai-gani aboard factoryships is frozen--not canned.

Development of Roller Extractor

Because of labor cost to recover zuwai-gani meat, several companies began to develop in 1967 a "roller" method for meat extraction. A very primitive roller method has been used for years: Pickers frequently use bottles to roll over the leg segments to force out the meat.

In the machine, the crab segments first are fed by belt to a large roller, which cracks the claws and other hard parts; then they go to a second roller, which squeezes out the meat from the segments. The meat is washed into a belt below. The shell passes through the rollers for discard.

The method does not produce good quality crab meat--mainly because water is used to remove the meat from the belt and rollers. Several major companies are now trying to develop a better machine. (Fisheries Attaché, U. S. Embassy, Tokyo, Feb. 6, 1968.)

## South Korea

### WILL SEND 2 TRAWL FACTORYSHIP FLEETS TO NORTH PACIFIC

Japanese sources report that South Korea plans to send 2 trawl factoryship fleets to the North Pacific in April 1968. One fleet of eight 99-gross-ton trawlers will be led by the 995-ton mothership "Samsu" (owned by Sam Yang Soo Sahn Fishing Co.); the second fleet of about 20 trawlers will be supported by the 8,000-ton freezership "Sinhung" (owned by Sinhung Cold Storage Co.). Both motherships are equipped with meal plants.

Will Fish Until October

The two fleets will fish until October 1968, north of 50° N. lat. and east of 170° W. long., primarily for Alaska pollock and rockfish. Most of the catch will be processed into fish meal for export to Australia. The fleet owners also plan to sell to Japan fish liberalized under Japanese import laws.

* * *

### JOINS TWO INTERNATIONAL FISHERIES COMMISSIONS

On Feb. 10, 1968, South Korea's Ministry of Foreign Affairs announced Korea's adherence to the FAO Indian Ocean Fisheries Commission and the FAO Fisheries Committee for the Eastern Central Atlantic. Both are newly established FAO regional fisheries organizations.

The affiliation reflects Korea's interest in bottomfish and tuna fisheries of the Indian and East Atlantic Oceans. (U. S. Embassy, Seoul, Feb. 26, 1968.)

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### FISHERIES DEPUTY DIRECTOR IS NAMED

Fisheries Administrator Jae Sik KIM has appointed Hee Un CHANG Deputy Administrator of South Korea's Office of Fisheries filling the post KIM formerly occupied.

CHANG is a graduate of the Pusan Fisheries College and has served the Office of Fisheries for 15 years. He is respected as an able technician and administrator.

South Korea (Contd.):

CHANG was formerly Chief of the Production Bureau. He had major responsibility for informal U. S. Bureau of Commercial Fisheries-Korean exchange program and enforcement of government's policy of abstention from salmon and halibut fisheries in the North Pacific. CHANG will be succeeded in this post by In Soo KIM, an economist with considerable experience in fisheries, and a graduate of the Fisheries College in Pusan.

* * *

FISHES INDIAN OCEAN

Two South Korean tuna longline fleets (totaling 10 vessels) departed Pusan in early January 1968 for the Indian Ocean. They stopped at Shimonoseki, Japan, for about 10 days to refuel and pick up ship supplies, gear, and bait.

Entry of foreign fishing vessels into Japanese ports is restricted under Japanese laws, but the 2 fleets were permitted entry by the Japanese Government because they were not fishing off Japan.

One fleet will operate out of Durban, South Africa, and the other will be based at Penang, Malaysia. Both were scheduled to begin about mid-February 1968. ("Nihon Suisan Shimbun," Jan. 15, 1968.)

## Indonesia

JOINT SHRIMP VENTURE WITH JAPAN IN INDONESIA DELAYED

Toyo Menka Kaisha of Osaka, a leading trading firm in Japan, was expected to ask the cooperation of the Japanese and Indonesian Governments in its plan to begin fishing and processing operations off West Kalimantan, Indonesia, starting March 1968.

In fall 1967, the firm had planned to set up a joint shrimp fishing and processing venture in West Kalimantan with major Japanese fishing enterprises, including Kyokuyo Hogei. But the plan was seriously delayed because Japan and Indonesia differed in interpreting territorial waters. ("Nihon Keizai Shimbun," Feb. 13, 1968.)

## Pakistan

PAKISTAN AND FAO SURVEY BAY OF BENGAL

A well-planned and systematic survey of the Bay of Bengal has been undertaken by East Pakistan's Fisheries Development Corporation (FDC) together with the UN's Food and Agriculture Organization. East Pakistan possesses vast fisheries resources in marine and inland waters covering 3,656,000 acres. The coastline of the Bay of Bengal alone extends 340 miles.

The Bay's marine resources remain almost untapped. No serious attempt has been made before to exploit East Pakistan's marine resources.

Start Is Made

FDC already has started to exploit the fish resources in the Bay of Bengal pending completion of the survey underway.

In its planning, FDC is relying mostly on data collected by past sporadic surveys. It has decided to use 10 trawlers in the Bay.

FDC is carrying out a scheme to mechanize fishing craft with outboard motors; 285 motors have been received from the Swedish Government under the "Freedom from Hunger Campaign." These were installed in locally built craft and distributed among fishermen on a hire-purchase basis. Nylon nets have also been distributed.

Of the mechanized boats, 91 have been floated in the Kaptai Lake for fishing, and 61 at Cox's Bazar for catching fish in the coastal waters. ("The Pakistan Fish Industry International," Feb. 1968.)

## Taiwan

1967 FISHERIES PRODUCTION ROSE 7.7%

Taiwan's fisheries production in 1967 was 458,223 metric tons, an increase of 7.7 percent over 1966.

| | 1967 | 1966 |
|---|---|---|
| | . . . (Metric Tons) . . . | |
| Deep-sea fisheries. . . . . . . . . . | 189,097 | 169,196 |
| Inshore fisheries . . . . . . . . . . | 186,540 | 172,330 |
| Coastal fisheries. . . . . . . . . . | 26,399 | 25,239 |
| Fish culture . . . . . . . . . . . . | 56,187 | 58,511 |
| Total. . . . . . . . . . . . . . | 458,223 | 425,276 |

Taiwan (Contd.):

It is significant that for the first time since 1945 deep-sea production surpassed inshore production. (The margin was small.) This was due to an increase in the number of large tuna long-liners (over 50 gross tons); they numbered 260 at the end of 1967.

Production from fish culture was set back due to insufficient supply of milkfish fingerlings. Normally, 160 million fingerlings are required for the 15,000 hectares of brackish water ponds; in 1967, only about 40 million fingerlings were available.

The landings by fishermen of the Matsu and Quemoy Islands (under military jurisdiction) are not included in total. These were an estimated 5,000 metric tons in 1967.

1967 Exports

Exports of fishery products totalled US$18.1 million in 1967.

| | Quantity | Value |
|---|---|---|
| | Metric Tons | US$ |
| Frozen fish (mostly tuna). . . . | 39,109 | 13,771,000 |
| Frozen shrimp . . . . . . . . . | 1,436 | 3,373,000 |
| Other species . . . . . . . . . | 300 | 1,000,000 |
| Total. . . . . . . . . . . . | 40,845 | 18,114,000 |

Large Purse-Seine Operation

A Taiwanese fishing company chartered large purse seiners from Japan to catch spotted mackerel and horse mackerel southwest of Okinawa. The fleet of 7 boats, including a net boat, one light boat, two search boats, and three fishery transports, arrived at Keelung (Taiwan) in November 1967 and started fishing in December. By the end of February 1968, 350 tons of mackerels had been landed. Most of the fish will be canned for export. (Contributed by T. P. Chan, Chief, Fisheries Division, Joint Commission on Rural Reconstruction, Taipei, Republic of China.)

## Hong Kong

COMMUNIST CHINA'S FISH EXPORTS RISE

In 1967, Mainland China sent to Hong Kong fishery products worth US$26.4 million--23 percent more than in 1966. The increase occurred despite an overall decrease of 18 percent in total Mainland Chinese exports to Hong Kong. The reason for this is that fishery exports, unlike others, are carried in small vessels--and were not affected by the turmoil of the 1967 "cultural revolution."

Imports from China in 1967 made up 64 percent of fishery sales on the Hong Kong market. (U. S. Embassy, Feb. 23, 1968.)

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FISHERIES EXHIBITION HELD

The eighth Hong Kong Fisheries Exhibition was held Jan. 29-Feb. 3, 1968, three years after the last one. It was considered a success: 44 exhibitors, including 2 U. S. firms and 3 local sales representatives for U. S. products, participated. Despite poor weather, there was a very large attendance. Considerable interest was shown in U. S. electronic equipment, outboard motors, and antifouling paints. (U. S. Consulate, Hong Kong, Feb. 14, 1968.)

## Southeast Asia Center Is Closer to Reality

The Southeast Asia Fisheries Training Center moved closer to reality when the agreement establishing it was signed by Philippines, Malaysia, and South Vietnam in mid-January 1968. On Feb. 7, the Japanese Government, which will play a leading role in the organization and smooth functioning of the center, appointed M. Morizawa (Deputy Director of the Japanese Fisheries Agency) as its representative on the center's Council of Governors. Other countries are now selecting their council members.

The Council of Governors will appoint staff, collect funds from members, and approve new members.

The center is designed to increase food-from-the-sea programs of members through applied research and training. More powered fishing vessels are needed and improved fishing equipment and techniques. Finding new resources and skilled fishermen to exploit these resources are also program priorities.

## Thailand

TRENDS IN THE FISHERIES

Fish are a major part of the Thai diet, The local annual catch amounts to over 700,000 metric tons. Individual fishermen, however, earn only marginal incomes.

An estimated 90 percent of the fishermen work alone and make subsistence catches. A few small cooperative ventures have at most 2 or 3 boats averaging 20 gross tons.

Influential Chinese Traders

The fishing community consists of about 80,000 families who maintain about 5,000 boats ranging from 10 to 50 tons. The catches are bought from the boats by 13 major Chinese traders. The traders are influential because they actually finance the entire fishing industry. The capital turnover of each of the 13 fish wholesalers is more than 10 million baht (US$475,000). But the wholesalers still are not willing to finance improvements in the fleet; the only industry in which they would invest is fish processing.

Buying fresh fish. (Photo: FAO)

Old Methods Used

The Thai are not seamen by tradition or inclination. Local fishermen are not very interested in deep-sea fishing, large boats, and electronic gear. They are not especially eager to learn modern techniques of commercial fishing. More sophisticated equipment, such as electronic devices and larger boats, are used only by the Government for research purposes.

Japanese Start Training School

The Japanese Government recently opened a fishermen's training school in Thailand. The school started with two, 400-ton, fully equipped vessels that can each accommodate 50 students and several Japanese technical advisers. Today, few Thai fishermen have any concept of sonar and other fish-finding equipment. Likewise, fishing boat builders prefer traditional methods and equipment.

School Could Change Things

After the Japan-sponsored school operates for a while, and new ideas get back to more fishermen in the villages, there may be changes in Thai attitudes and methods. A demand may develop for electronic depth finders, fish-finding sonar equipment, navigation equipment, marine propulsion and steering gear, fishing boats 100 to 200 gross tons, marine engines of 300-400 horsepower, winches, wire ropes and trawl nets, shrimp boats, and ice plants using sea water designed for use aboard ships.

Fish wholesalers in Phuket recently asked about purchasing U.S.-made ice plant equipment. The real market and need for U.S. goods in Thailand is in fish processing. The wholesalers buy up the fish cheaply from individual fishermen and resell it at sizable profits. They are financially able and motivated to buy more efficient U. S. quality goods. (U. S. Embassy, Bangkok, Mar. 7, 1968.)

# SOUTH PACIFIC

## Landings of Skipjack and Yellowfin Tuna at Papeete Market (Tahiti)

Throughout French Polynesia, there is a subsistence fishery for skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tuna. In Tahiti, these fish are caught from fishing boats usually called "bonitier." The boats are diesel powered and about 30 feet long. They do not have refrigeration and have to return each afternoon with the catch. This limits the fishery area to the immediate vicinity of Tahiti.

The fish are caught with pole and line by a two- or three-man crew. The Polynesian pearl-shell lure is in common use, although other types are also employed. Live bait is not used. In recent years, trolling lines have been used when searching for surface schools of tunas. More detailed information about this fishery has been presented in Commercial Fisheries Review (Van Campen, 1953).

Boats and Landings Increased

The number of boats employed in this fishery has increased steadily in recent years. The number of fishing craft for 1954-1967 is shown in figure 1. There were 15 boats in 1954 and 107 in 1967--more than 7 times more.

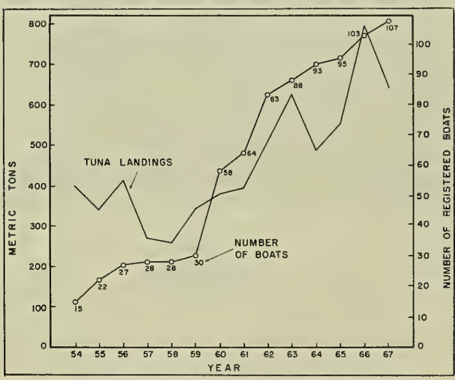


Fig. 1 - Combined landings of skipjack and yellowfin tuna, and numbers of boats engaged in the tuna fishery.

Also shown in figure 1 are landings for that period. In general, landings, have been increasing with the number of boats employed in the fishery. During 1954-1967, the catch of skipjack and yellowfin tuna fluctuated from 259 to about 731 metric tons. As the fish are gilled and gutted at sea, the weights of landings reported here are for eviscerated fish.

Monthly landings of skipjack tuna at the Papeete Municipal Market for the period 1954-1967 are shown in table 1[1/]. The same information for yellowfin tuna is shown in table 2[1/]. Nearly all skipjack caught by the Tahiti fleet pass through the Papeete Market. This used to apply also to yellowfin but,

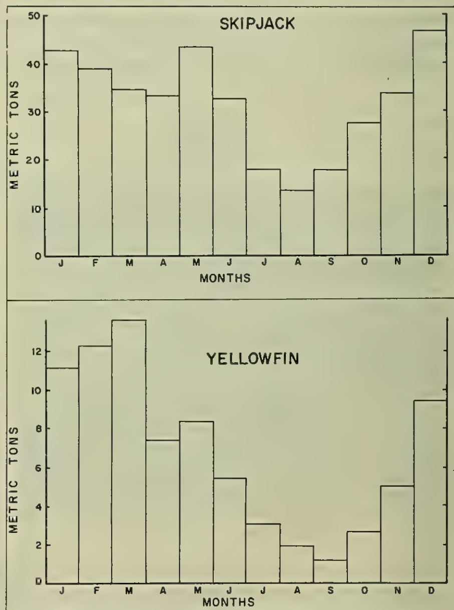


Fig. 2 - Average monthly landings of skipjack and yellowfin tuna (based on the data for the period 1954-1967).

1/All statistics are in the appendix to reprint (Separate No. 813) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 813

beginning in recent years, the larger yellowfin are often sold directly to store or hotel owners and are not included in market statistics.

The monthly landings of skipjack and yellowfin are illustrated in the two panels of figure 2. There is considerable variation from month to month. The lowest catches of both species occur rather consistently during the austral (Southern) winter.

Longlining

In the general area of Tahiti, tunas are also caught on longline gear, primarily by Japanese longliners. (For details, see journal "Tuna Fishing.") Catches of skipjack by longline gear are negligible because this gear appears effective only for deep-swimming tunas, such as yellowfin, bigeye (T. obesus), albacore (T. alalunga), and various spearfishes (Istiphoridae and Xiphiidae).

In 1961-1965, a French fisherman fished for tunas with longline gear but later transferred his operation to the Cook Islands. In 1967 a change occurred in the Tahitian tuna fishery. Several bonitier operators felt that by converting their boats for longlining, they could catch more tunas. By the end of 1967, there were already three such converted boats. (See figure 3.) The converted boats fish with gear consisting of 60 baskets (6 hooks to a basket). On the average, they catch 4 kg. of tunas and spearfishes per basket per day. Like the original bonitiers, these boats lack refrigeration and operate only on a daily basis.

Fig. 3 - Tahitian tuna boat converted for longlinging. (Photo: M. Brun.)

Tahiti's Fishing Future

The authors believe that because of Tahiti's geographical position in relation to the Pacific tuna fishing grounds, it will become eventually either a center for a locally based, longline fishery--or a transshipping base for one or more of the foreign tuna longlining fleets. These fleets of Formosa, Japan and Korea are already well developed, while the nucleus of the Tahitian fleet is very small.

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By Michel Brun
Boîte Postale 567
Papeete (Tahiti), French Polynesia

and

Witold L. Klawe
Inter-American Tropical Tuna Commission
La Jolla, Calif. 92037, USA

## Australia

ARTICLES ON SHRIMP FISHERIES

The January 1968 issue of "Australian Fisheries Newsletter" contains a 31-page review of shrimp in northern Australia. It describes how scientists, technologists, administrators, and fishermen are cooperating in a program to develop the resource. There are articles on the industry, processing and packaging methods, marketing, vessels and gear, and biology of the shrimp. The review is illustrated.

The Newsletter is published by the Fisheries Branch, Department of Primary Industry, Canberra, A.C.T., 2600, Australia.

## American Samoa

REPORT ON 1967 FISHERIES

The canning of tuna and the manufacture of byproducts continued to dominate the economy of American Samoa in fiscal year 1967 (July 1, 1966-June 30, 1967). Two U. S. tuna canning companies operate factories on Pago Pago Bay, one of the finest natural harbors in the South Pacific. An American Can Co. plant, located between the 2 canneries, feeds locally manufactured cans to both processing plants. Van Camp Seafood, a division of Ralston Purina Co., came to American Samoa in 1954; Starkist Samoa, a division of H. J. Heinz Co., started in 1963. At the end of FY 1967, Starkist employed about 500 Samoans, compared with 382 at the end of FY 1966. Van Camp employed about 450 Samoans, about the same as at the end of FY 1966. These employes work in processing and maintenance positions.

Foreign Fishermen Provide Tuna

Samoans do not like to go to sea for weeks to supply these canneries, so the tunas are provided by Asian fishermen whose companies work under contract with the canneries. At the end of FY 1967, over 4,000 Nationalist Chinese, Korean, and Japanese fishermen, working on 220 vessels brought to Samoa from Asia, were supplying fish. At the end of FY 1966, about 2,500 fishermen and 135 vessels were working for the 2 canneries.

The canneries combined employed at end of FY 1967 about 48 percent Nationalist Chinese, 30 percent Koreans, and 21 percent Japanese.

The Vessels

Each fishing vessel uses most of its interior space for freezing and storing freshly caught tuna. It is at sea 60-90 days; some vessels go as far as 600 miles from Pago Pago. An average 60 tons of tuna is brought back. The vessel stays in port 4 or 5 days for offloading and provisioning.

Exports

In FY 1967, 2,359,860 cases of canned tuna fish worth US$25,438,615 were exported. Also: 324,077 cases of pet food (from tuna byproducts) worth $1,102,354; 3,873,300 pounds of fish meal, $196,850; 1,175.6 tons of frozen fish, $420,527; and 890 cases of wahoo, $6,358.

Seek Bait Species

Potential bait species were surveyed for possible skipjack fishing. Several possibilities were mullet, silver sides (Atherinidae), anchovy (Engraulidae), and round-bodied sardine (Dussumieriidae). Of the 4, many mullets were seen in numerous bays and coves along Tutuila's southern coastline. Large numbers of round-bodied sardines were seen in Pago Pago Harbor. Of the numerous coves and bays, Faga'alu, Alofau, and Tafuna lagoon are most ideal for baiting. It is difficult to assess the availability of bait in supporting a hand-line tuna industry at this time. ("American Samoa 1967 Annual Report to the Secretary of the Interior.")

* * *

TAIWAN VESSELS PREDOMINATE IN TUNA FISHERY

In Jan. 1968, there were 164 foreign tuna vessels operating out of American Samoa: 85 belonged to Taiwan, 58 to South Korea, and 21 to Japan. One year earlier, Taiwan had 58, South Korea 56, and Japan 25 vessels working out of that island.

In Jan. 1968, the 3 countries delivered about 2,354 short tons of tuna to American Samoa--Japan 16 percent, South Korea 48 percent, and Taiwan 36 percent. ("Katsuomaguro Tsushin," Feb. 26, 1968, and other sources.)

# AFRICA

## South-West Africa

1968 PILCHARD CATCH
MAY HIT 1,750,000 TONS

The total pilchard catch off the South-West African coast in the 1968 season will almost certainly set a record. It will be well over a million tons and could approach 1.75 million tons.

Assuming that all 8 land-based pilchard factories catch and process their full quota, this will result: The basic catch will comprise 498,000 short tons for the 5 factories now on a 99,600-ton quota; plus 270,000 tons for the 3 plants restricted to 90,000 tons each. Add, too, another 99,600 tons for the new Sarusas Development Corp. license and the 99,600-ton quota allocated to the white-fish licensees. (This is provided they reach a practical agreement on partial amalgamation.)

1.3 Million Tons

This gives 967,200 tons. To this can be added a probable 350,000 tons taken by the 2 factory vessels, "Willem Barendsz" and "Suiderkruis." So the catch processed by South-West African shore and sea-based ventures will probably reach 1.3 million tons. But this takes no account of the catching effort by foreign nations interested in pilchard, headed by the Soviet Union.

The USSR has operated trawlers and factory vessels off the territory. Their combined pilchard catch may well exceed a conservative estimate of 300,000 tons. In May, the Soviet fleet probably will be joined by the giant "Vostok," 43,000 tons, which will dominate the world factoryship arena. She will be fed by her own fleet of fibre-glass catchers. How she will fare in her first season out from her builder's yard is conjecture. But it would be surprising if 300,000 tons were not fed into her reduction plant before the end of December. ("South African Shiping News and Fishing Industry Review," Jan. 1968.)

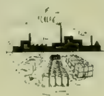
* * *

FACTORIES PROCESSED
RECORD 790,000 TONS IN 1967

In 1967, a record catch of well over 1.5 million short tons was landed by the combined fleets of South and South-West Africa. Although the figures are incomplete, it is clear that the Republic's bumper catch again was eclipsed by South-West Africa's; there 790,000 tons of fish were caught and processed.

The 790,000 tons include spiny lobster caught at Luderitz, seasonal snoek, and a small trawl catch. The bulk is over 780,000 tons of pilchards and a few thousand tons of anchovy. The latter were processed into 185,000 short tons of fish meal, 37,000 long tons of fish-body oil, and 167 million pounds of canned fish. The last figure was only 6 million pounds short of the 1960 record.

In South-West Africa, the pilchard comprised about 98 percent of the total catch of around 790,000 tons; in the Cape west coast fishery, the pilchard catch slumped further in 1967--to 81,000 tons or 14 percent of the total catch. ("South African Shipping News & Fishing Industry Review," Jan. 1968.)



## Tunisia

REPORT ON FISH CANNING INDUSTRY

The food preservation industry in Tunisia has been an important element in the economy since World War II. It employs 5,000 people. Indirectly, it assists agriculture, container makers, shippers, and retailers. More important, canned food is one of Tunisia's few manufactured exports. In 1966, it provided US$4 million worth of foreign exchange.

After the war, French demand in Tunisia and in France spawned many small canning firms generally owned and managed by French and Italians. The first plant of any size was located at Sidi Daoud, across the Bay of Tunis from Tunis. It processed tuna and sardines. Other firms developed in the fish industry. In the early 1950s, the canning of tuna and sardines in olive oil was introduced.

Tunisia (Contd.):

It was not until the mid-1950s, however, that vegetables and fruits were canned in any quantity.

## 5 Companies Can Fish

The canning of fish is limited to 5 companies. One is the "Office National de Peche" (ONP), which controls 63 percent of fish canning, as well as the fishing fleets and fresh-fish marketing. ONP control has hampered the growth of private canning companies. ONP has a tuna-canning factory in Sidi Daoud on the Bay of Tunis and 5 other plants in the fishing ports of Sousse and Mahdia (sardines).

The largest privately owned and operated fish-canning company is Sfar. It has 8 percent of the Tunisian canned goods market. Sfar began in 1961 as a major fish packer, but recently it has begun to shift to vegetables and fruits. However, its growth prospects and those of the private canning sector in general are not encouraging. This is because of competition from Government-supported companies and cooperatives that have easier access to capital--and largely control allocation of raw materials. Many producers feel that private initiative in the canning industry is being smothered by public competition. They feel it is a competition not strictly subject to the economic discipline of profit and loss, and has the insurance of Government backing.

## Planned Marketing In Infancy

The concept of planned marketing is in its infancy in Tunisia, especially as it applies to export sales. Domestic distribution of canned goods is improving as the traditional "Djerbian" retail outlet gives way to the new commercial units. Domestic demand also is increasing. This is due primarily to the growing institutional requirements for preserved food. It is aided also by a changing way of life that leaves less time for domestic chores.

Still, the only canned-food product with a solid domestic market is tomato paste. About 40 percent of Tunisian canned-food production is exported, 73 percent of it to France. During the past 2 years, France has offered duty-free quotas for 2,500 tons of canned fish, 4,000 tons of canned vegetables (including not more than 500 tons of tomato paste), and 1,000 tons of sugared fruit preserves.

## Industry Outlook Cloudy

The outlook for the Tunisian canning industry is cloudy. Much needs to be done to improve quality, increase quantity, and reduce the cost of products. Much depends on exterior market conditions over which Tunisia has little or no control.

It has been suggested by the International Bank for Reconstruction and Development and others that Tunisian canning companies negotiate a working relationship with a large U. S. or European firm to acquire the necessary technical skills. One U. S. company looked into the possibility of licensing a local firm to use its process and sell to Europe under its label. This fell through when problems of bringing home dinar earnings were met. Also there appeared to be an insufficient supply of fruits and vegetables. However, another U. S. company recently has shown interest. (U. S. Embassy, Tunis, Jan. 29, 1968.)

# INDEX



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INDEX (CONTINUED)

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

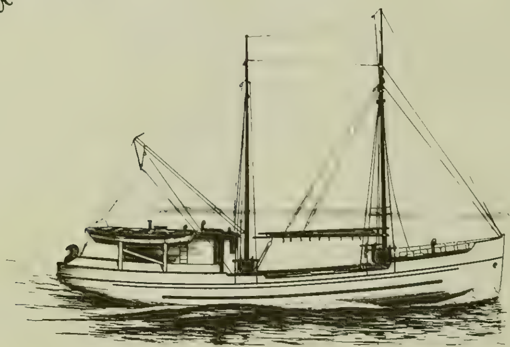
As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

# Bureau of Commercial Fisheries



# Assists Halibut Industry

The Bureau is cooperating with the Halibut Association of North America to increase consumer awareness of North Pacific halibut and to assist the industry in marketing the expected large spring and summer supply. The Halibut Association and BCF are providing halibut steak recipes and photographs to newspaper food editors. The Halibut Association is sponsoring a series of television "spot" announcements in color which include identification of local participating retailers. In addition, the Department of Agriculture is assisting by including halibut steaks on its April "List of Foods in Plentiful Supply."

The Bureau of Commercial Fisheries is encouraging the food trade industry to participate in the halibut campaign. Further details on the promotion may be obtained from the Branch of Marketing, Bureau of Commercial Fisheries, 1801 North Moore Street, Room 408, Arlington, Virginia 22209.

# COMMERCIAL FISHERIES Review

VOL. 30, NO. 5 MAY 1968



Fishing vessels in port at Sfax, Tunisia.

# COMMERCIAL FISHERIES
## Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.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Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209. Telephone: Area Code 703 - 557-4246.

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# CONTENTS

A basketful of northern shrimp taken within 50-mile radius of Boothbay Harbor, Maine. (Photo: R. L. Dow)

# THE U. S. EDIBLE FISH SITUATION

In the early months of 1968, supplies of edible fishery products ran 10 to 12 percent below a year earlier. Tighter supplies resulted in rising prices for most fishery products.

April 1 stocks of edible frozen fish were 12 percent below April 1, 1967. Stocks of frozen fillets and fish sticks and portions were a fifth lower than a year earlier. Holdings of cured fish were down about a third. Total stocks of shellfish were 6 percent above a year earlier because of plentiful supplies of processed shrimp products. Stocks of raw, headless, shrimp were adequate. Stocks of other shellfish were scarce.

During January-February, imports of fishery products were slightly higher than during the same months in 1967. Domestic landings were about the same to slightly below.

Late Spring-Early Summer

Supplies of fish and shellfish will increase seasonally during late spring and early summer as domestic landings pick up. However, total supplies are expected to continue below year-ago levels. The quantity of fish in Canada, a major U. S. supplier, is also 10 to 15 percent below last year.

Normally, a small seasonal decline in fish prices occurs in the second quarter. It is likely that prices will not show the usual seasonal decline in the second quarter because of tight supplies. Retail prices rose gradually from November 1967 to February 1968. The sharp increase in wholesale prices in November and December 1967 is likely to be reflected in gradual increases in retail prices in the second quarter of 1968.

1968 Forecast

Despite lower supplies and higher prices, total consumption of fish and shellfish is expected to increase in 1968. However, indications point to a slight decline from 1967 in per-capita consumption of fresh and frozen fish. A substantial gain in imports and/or domestic landings would be necessary to keep per-capita consumption of fresh and frozen fish at year-ago levels. Per-capita consumption of canned fish and shellfish likely will hold at the 1967 level.

Among the popular fresh and frozen fillet items, only supplies of cod are likely to increase over a year ago. Supplies of haddock--and probably flounder too--are expected to decline again in 1968.

In sticks and portions, current supplies are a fifth below 1967. Any increase in sales likely will be for fish portions rather than fish sticks.

West Coast Fisheries

In the West Coast fisheries, supplies of halibut will be adequate for consumer needs. Halibut prices are currently below year-ago levels but are expected to rise during the annual marketing year that began in April.

Canned salmon stocks have been short in recent months. Landings of salmon are expected to improve over the very low level of

last year; prices likely will ease somewhat from current levels, depending on abundance.

Supplies of king crab, imported lobster tails, live lobsters, and scallops are scarce; prices are record high.

King crab landings in Alaska in early 1968 were much below a year earlier. Prices rose steadily. Even when landings pick up seasonally in the summer, prices are not expected to decline very much.

### Lobster Tail Imports

Imports of lobster tails are seasonally heavy. As a result, a slight increase in holdings was evident in recent months; however, holdings continue well below a year earlier. The current volume of imports brought about a slight but temporary decline in lobster tail prices. Even if imports become abnormally heavy in the next month or so, prices would not be expected to drop to year-earlier levels.

### Scallops Gain Gradually

Stocks of scallops showed a gradual gain in early 1968 but still were well below a year earlier. The tremendous increase in prices during second-half 1967 apparently leveled off. Prices of scallops probably will weaken a little when fishing increases seasonally in the spring, but they will remain far above year-earlier levels.

### Shrimp Plentiful

Stocks of processed shrimp products--breaded, peeled and deveined, and specialty products--are plentiful. Stocks of raw, headless, shrimp are heavier than a year ago, but supplies of larger shrimp are scarce and adequate only in medium sizes. Prices of raw, headless, shrimp are expected to continue gradually upward until about June 1. After that, prices for medium and small shrimp can be expected to decline seasonally as landings from the new crop are received. The seasonal decline is not expected to be as great as a year ago. Prices for large shrimp are expected to continue gradually upward until volume production begins in late summer. (BCF Branch of Current Economic Analysis.)

# UNITED STATES

## Shellfish Prices Expected to Remain High in 1968

In 1967, the harvest of shellfish other than shrimp declined. Imports were lower. Together, these factors helped boost prices in several categories to record highs. Record shrimp landings gave the U. S. its first $100 million fishery.

This, and much other information, is contained in BCF's annual review, "Shellfish Situation and Outlook." It lists sea scallops, soft clams, king crab, blue crab, live northern lobsters, and lobster tails as recordbreakers in wholesale pricing. Small declines from 1966 record prices are estimated for frozen shrimp and hard clams; but both were still well above average price levels in 1967. The only significant weakening occurred in the market for shucked oysters; it dropped nearly 9 percent below the 1966 average.

Shrimp

U. S. shrimp landings in 1967 were 191 million pounds (headless weight). Shrimp imports were a record 202 million pounds. At the beginning of 1967, inventories were above average. These elements combined made a total of 436 million pounds of shrimp available to U. S. consumers during the year. U. S. consumption of fresh and frozen shrimp for 1967 is estimated at 290 million pounds, based on South Atlantic and Gulf landings, a 6-percent gain over 1966.

Sea Scallops

Supplies of sea scallops dropped about 30 percent in 1967. The domestic catch of 10 million pounds was 40 percent below 1966's relatively low catch; imports of 13.5 million pounds were the lowest since 1963. Because supplies were short, the 1.2-million pound carryover for Jan. 1, 1968, was the lowest since 1946. The estimated total U. S. scallop consumption of 25.6 million pounds in 1967 was the lowest since 1958. Sales for the first 4 months of 1968 are expected to reach only 6 million pounds; they were 8 million for the 1967 period.

Lobsters

Domestic catch and imports of northern lobsters continued to decline. The 1967 imports of 15.6 million pounds were the lowest since 1945. Total U. S. landings in 1967 are estimated at 24.8 million pounds; these include 16.1 million pounds from Maine waters. Dockside lobster prices in 1967 were 8 percent above 1966. Wholesale prices for early 1968 are averaging about 50 cents a pound higher than prices of early 1967.

In the scallop fishery, decreasing abundance has been reflected in a smaller number of boats making fewer trips. The lobster, however, is pursued by means more accessible to the amateur. The smaller number of full-time lobstermen has been offset by more casual fishermen--all setting more traps than before. The net result is increased effort in this fishery.

Lobster supplies for first-half 1968 are expected to be no greater than those in 1967, possibly a little lower. Prices will probably continue above year-ago levels.

Spiny Lobster Tails

Consumption of spiny lobster tails in 1967 is estimated at 30.3 million pounds--8 percent over the previous two years. Supplies were down slightly from 1966. They totaled 34.1 million pounds, including 27.3 million in imports. The Jan. 1, 1968, carryover of 3.8 million pounds represented a drop of 44 percent below Jan. 1, 1967.

At the mid-April record price level (about $2.65 per pound wholesale), spiny lobster sales are expected to be about 10 million pounds for Jan.-April 1968. The demand will probably be strong enough to prevent any sizable increase in holdings.

Aquaculture

The U. S. Government wants to help solve the problem of high prices and scarce supplies of shellfish. The U. S. is broadening its investigation of the technical and economic feasibility of aquaculture. Other areas of

study include improved techniques for forecasting available supplies, and more effective ways to locate and harvest various species.

## U. S. Studies Effects of Imports on Some Fish

BCF is studying the effects of groundfish imports on the health of the U. S. industry. BCF acted at the request of Congressmen and representatives of the New England and Pacific Northwest sections of the industry.

The 2-month study will involve cod, haddock, hake, pollock, cusk, ocean perch, and flounder. It will deal only with imported fillets and blocks. Frozen fish blocks become fish sticks and portions, among the most popular ready-to-cook or ready-to-heat products.

### Imports Almost Doubled

BCF statistics show that in the past 10 years imports of groundfish fillets and blocks soared from 161,369,000 to 316,860,000 pounds. While this was going on, major parts of the U. S. groundfish industry complained of falling sales.

In 1967, imports contributed a major part of U. S. consumption of these items.

## Fur Seal Auction Held

The Fouke Fur Co. held its spring sale in Greenville, S. C., April 4-5, and 23,167 Alaska sealskins were sold for the account of the U. S. Government. Prices for dressed, dyed, machined, and finished skins (DDM&F) averaged $111.47, 31.2 percent above the September 1967 sale. Blacks increased 40.8 percent, Mataras 29.3 percent, and Kitovis 8.8 percent. One lot of Matara skins sold for $202, considered a record for this product. A year ago, one lot of Mataras sold for $190, a record at that time. Natural Lakodas averaged $90.71--27.2 percent higher than the previous sale. Sandrift Lakodas averaged $58.61 and Dark Blue Lakodas averaged $39.52, down 18.7 and 43.7 percent, respectively.

### Income for U. S. & Alaska

Total sale income to the U. S. Government was $1,690,000. Payment to Alaska in fiscal year 1969 under provisions of the Alaska Statehood Act should amount to about $325,000.

## Walleye Tagging Study Slated for Eastern Lake Erie

BCF biologists will conduct a walleye-tagging project in the New York waters of Lake Erie this spring. The study will be directed by Harry Van Meter, chief of BCF's Lake Erie investigations. Tentative plans call for capturing and tagging 6,000 walleyes offshore from Barcelona and Dunkirk, New York, during May. To do this, BCF has engaged a commercial fisherman for the netting operations. Research biologists will be aboard the vessel to tag the walleyes and record measurements. The fish will then be released in the immediate vicinity of capture.

### Study's Objectives

The study's primary objectives will be to determine whether these walleyes move to other parts of the lake, how fast they grow, and how abundant they are. The numbers of walleyes frequenting the eastern basin of Lake Erie have increased during the past decade; those in the western basin have declined tremendously. Other than this, very little is known of the natural history of the walleye in the eastern basin. A similar walleye-tagging study was conducted in the western basin in 1959. The findings were published in 1963.

The tag is a small, yellow, neoprene tube commonly called a "dart tag." It is partially inserted into the flesh just below the dorsal fin. It is about 4 inches long and bears a printed number and mailing address.

The success of the eastern basin study will depend on the voluntary return of tags. Sport and commercial fishermen are requested to send in the tag with information about place of capture, date, and length of fish. Fishermen who return the tags will be notified of the area of release and other pertinent data on the fish they caught.

## Udall Approves Clean-Up Program for Lake Michigan

Secretary of the Interior Stewart L. Udall has approved a Federal-State program to help restore the water quality of Lake Michigan He recommended a course of action for cities, industries, and State and Federal Governments to reduce the pollution of Lake Michigan. The program is based on suggestions coming out of an enforcement conference in Chicago, Ill., in Jan., Feb., and March 1968, of the 4 states bordering Lake Michigan and the Federal Government.

Officials from Michigan, Indiana, Illinois, and Wisconsin said after the conference that "Lake Michigan is a priceless natural heritage which the present generation holds in trust for posterity, with an obligation to pass it on in the best possible condition."

Highlights of Udall's Recommendations

Highlights of Secretary Udall's recommendations to curb the serious pollution of Lake Michigan include:

- By the end of 1972, all cities in the Lake Michigan Basin must provide at least 80 percent removal of phosphorous from their wastes. They must comply with the water-quality standards approved by Secretary Udall for Lake Michigan. Phosphorous is a key fertilizer of algae, rapidly growing tiny plants that are a serious pollution problem.

- Industries must curb their pollution to comply with Lake Michigan water-quality standards approved by Udall. This must be substantially accomplished by December 1972.

- Representatives of those who participated in the conference will agree within 60 days on uniform rules and regulations to control wastes from boats.

- Disinfection must be continuous for all municipal wastes. This must be done as soon as possible and no later than May 1969.

- Eliminate the discharge of oil into Lake Michigan. The State conferees recommended strengthening of Federal legislation controlling oil pollution.

- Stop dumping of polluted dredging materials into Lake Michigan as soon as possible. The Army Corps of Engineers and the States are requested to report within 6 months on what they are doing about it.

- The States and the U. S. should support a program to control or prevent pollution resulting from die-off of alewives, small inedible fish. Last summer, millions of these died in Lake Michigan.

- Ask U. S. Department of Agriculture to report to conferees within 6 months on agricultural programs to prevent pollution from siltation.

- Within 6 months, each State water-pollution control agency shall list cities and industries discharging wastes into Lake Michigan Basin. Interior Department will provide a list of Federal installations discharging wastes into the Lake. Develop a plan to treat all wastes harming Lake Michigan.

- Encourage discharge of treatable industrial wastes, following needed preliminary treatment, to municipal sewer systems.

- Effective immediately, combined sewers are to be separated in coordination with all urban reconstruction projects and prohibited in all new developments. Exceptions are where other techniques can be applied to control such pollution. Pollution from combined sewers is to be controlled by July 1977.

- The States and Interior will appoint members to a special committee to consider the problem of waste from nuclear power plants, including possible thermal pollution.

- Each State water-pollution control agency should speed programs to provide maximum use of area-wide sewage facilities.

- A technical committee on pesticides will be established to recommend a program to monitor and control this type of pollution.

- Appoint a committee to develop recommendations for a coordinated State-Federal monitoring program in the Lake Michigan Basin.

- State agencies and Interior should inventory all sites of potential major spills of oil and other pollutants.

- State agencies should arrange for water-quality analyses to be performed at least twice weekly at these water-filtration plants:

Green Bay, Milwaukee, Evanston, Chicago (both plants), Gary, Michigan City, Benton Harbor, and Grand Rapids.

• The Coast Guard will be asked to report on plans to monitor pollution in Lake Michigan by aircraft and other means.

## Cut Weight Loss When Smoking Halibut and Salmon

An experiment that reduced the considerable loss or shrinkage normally occurring in the smoking process during commercial production of smoked halibut and salmon was conducted by BCF's Technological Laboratory in Seattle, Wash.

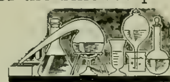
The commercial process consists of soaking pieces of slacked (defrosted) fish for 45 minutes in a saturated sodium chloride (NaCl, common salt) brine solution. Smoking continues overnight at $60^{\circ}$ to $70^{\circ}$ F. Then the pieces are heated for an hour at $180^{\circ}$ to $190^{\circ}$ F.

Smokehouse.

### The Lab's Experiment

In the Seattle lab's experiment, pieces of halibut were preheated with solutions containing sodium tripolyphosphate (TPP) before smoking. The researchers found that TPP reduced the loss in weight during the smoking operation. Adding 2% TPP to the saturated brine solution used to soak the fish for the 45-minute period reduced weight loss from 30% to 25%.

Using a short, 1-minute dip in 7.5% TPP solution containing 2% NaCl reduced weight loss to 26%. The TPP did not affect flavor or texture of the smoked product.



## Sport Fishing Licenses Rose Slightly in FY 1967

State hunting and fishing permit sales in the U. S. increased slightly in fiscal year 1967. Total income from them to the wildlife agencies reached $154 million. So announced Interior Department's Bureau of Sport Fisheries and Wildlife on April 22, 1968.

The Bureau compiles the fiscal year figures from reports of the 50 States. The reports showed 20 million hunting licenses, tags, permits, and stamps issued in fiscal year 1967--about 500,000 over FY 1966. Total fishing licenses, tags, permits, and stamps issued increased from 26 to 27 million.

### Sportsmen's Outlays

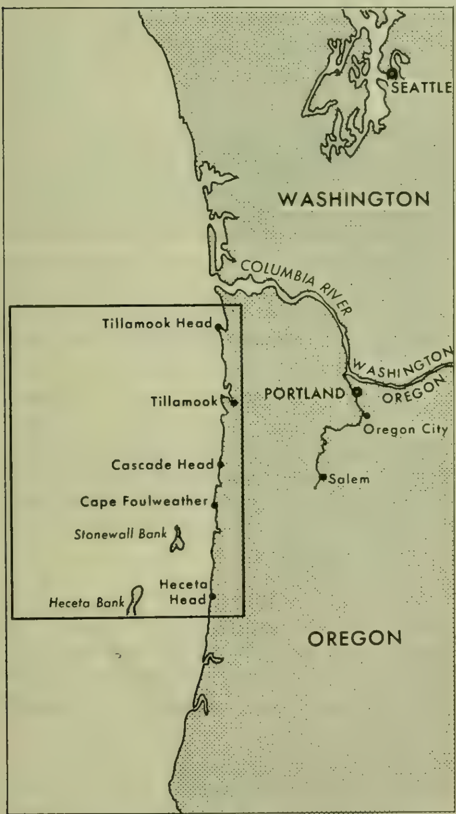
Expenditures by hunters for permits increased from $77 million to $81 million. For fishermen, the increase was from $67 million to $73 million. Bureau Director John S. Gottschalk said: "These increases are small, but healthy," demonstrating that fishing and hunting continue to be a major form of recreation in our society."

Pennsylvania led all states in hunting permits issued; California was way ahead in fishing permits.

# OCEANOGRAPHY

## Sea Bottom Off Oregon Mapped

The Coast and Geodetic Survey has published a bathymetric map covering 14,000 square statute miles of sea bottom off the Oregon coast. The map includes 2 banks rising to within 78 and 150 feet of the surface. It provides the most detailed bottom topography ever published for this section of the Pacific Ocean.




Area covered by bathymetric map (1308N-22) of sea bottom off Oregon issued by ESSA Coast and Geodetic Survey.

The map covers 100 miles offshore for a 140-mile coastal stretch between Heceta Head and Tillamook Head. The depths range from a few feet off the coast to more than 9,800 feet about 80 miles west of Heceta Head.

Depth contours reveal in detail a relatively smooth bottom for about 60 miles offshore. This is followed by a series of valleys and ridges. Prominent underwater features include: Heceta Bank, about 35 miles offshore, rising to within 150 feet of the ocean's surface; and Stonewall Bank, about 17 miles from Oregon shore, about 78 feet below surface.

West Coast Maps Planned

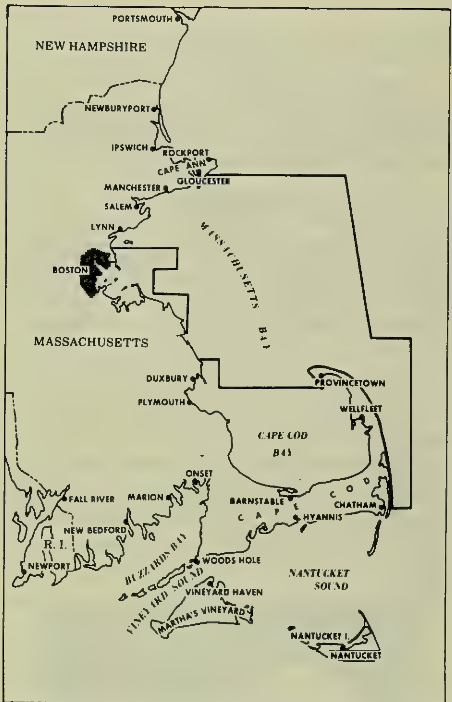
The Coast and Geodetic Survey plans a series of maps for the entire Pacific coast and for the seabeds off the Atlantic and Gulf of Mexico coasts. The maps are designed to aid U. S., State, and industrial interests explore and develop the potential resources of the Continental Shelf. This is an area of about 862,000 square statute miles off the U. S. coasts. Economic development of these resources depends heavily on bottom topographic maps; few exist.

## Six-Month Hydrographic Survey of Massachusetts Coast Underway

The U. S. Coast and Geodetic Survey is conducting a 6-month hydrographic survey of the Massachusetts coast. Part of a 5-year program begun last year, it includes detailed measurements of the Beverly and Salem harbors.

The 162-foot, 760-ton, 36-man USC&GS ship "Peirce" began the survey in mid-April and will continue until October. It will cover the coastal area from Beverly and Salem, north to Gloucester, where last year's survey ended, and then out to sea and south in a clockwise move to a point off Marblehead.

The survey will not cover recently surveyed Cape Cod Bay, or the area in and around Boston Harbor, also previously surveyed, except for Winthrop Harbor. But the survey will




Box indicates area of Massachusetts coast being surveyed by ESSA Coast & Geodetic Survey as part of a five-year program which began last year. Survey will resume at Beverly and Salem and continue this year north toward Gloucester.

embrace all other coastal harbors as far as Cape Cod by the time it is completed.

The Operation

Operating from the ship and from launches, the Peirce's hydrographers measure and record depths as determined by the time required for a sound wave produced in the vessel's hull to reach bottom and its echo to return. The return echo is recorded on a permanent graph at rapid intervals; the echoes form a continuous profile of the sea floor as the vessel covers a predetermined course. The hydrographers obtain the shape and slope of submerged elevations and depths, including any existing significant features, such as peaks, deeps, canyons, and cliffs.

## Geologic Study of Gulf of Mexico Begins

Scientists of Interior Department's Geological Survey and the U. S. Naval Oceanographic Office have teamed up on a 1-year geologic study of the Gulf of Mexico. Part of the study is underway. The project seeks to "obtain new and significant knowledge of the major earth structures that underlie the Gulf, and the mineral resource potential of sea floor sediments and sub-seafloor rocks."

The joint Navy-USGS project is described as "the most comprehensive effort yet planned to obtain new information about the nature and properties of a major part of the Gulf floor--which has a total area of more than 600,000 square miles."

New Research Vessel

Geological and geophysical surveys will be conducted aboard the Navy's newest oceanographic research vessel, the 300-foot "Elisha Kane." The vessel is capable of obtaining continuous sea-surface temperature, bathymetric data, "sparker" subbottom profiles, and magnetic measurements. It will handle and process data from physical, biological, chemical, meteorological, and photographic programs.

About 20 U. S. Geological Survey earth scientists will take part in parts of the program with scientists of the Oceanographic Office. They will provide research support in marine geology, geophysics, geochemistry, paleontology, and hydrology. Land-based laboratories and other facilities also will be involved.

Important Map

The project will make it easy to prepare a map showing structures resulting from deformation of the earth's crust for the entire Gulf of Mexico. This "tectonic" map will supplement data from the adjacent land areas shown on the Tectonic Map of North America recently published by the USGS. It would show features of the Gulf's submerged lands, such as folds, faults, and thicknesses of sediments. The map will provide answers about a major unknown area in knowledge of North America's geologic structure.

There will be a geochemical laboratory aboard the Kane that can determine even

USGS oceanographic research vessel Elisha Kane.

trace amounts of minerals present in cores collected from the sea floor during the cross-Gulf cruises. Hundreds of analyses of sea-floor sediments will provide for the first time a general view of the entire Gulf's geochemistry.

The 2 agencies stated: "Both the Navy and the Geological Survey wish to encourage participation from all scientific groups concerned with the geology of the Gulf of Mexico. . .discussion will be held with interested parties in universities and industry to assist in the formulation of this comprehensive study."

## Whales Observed in Western Gulf Stream

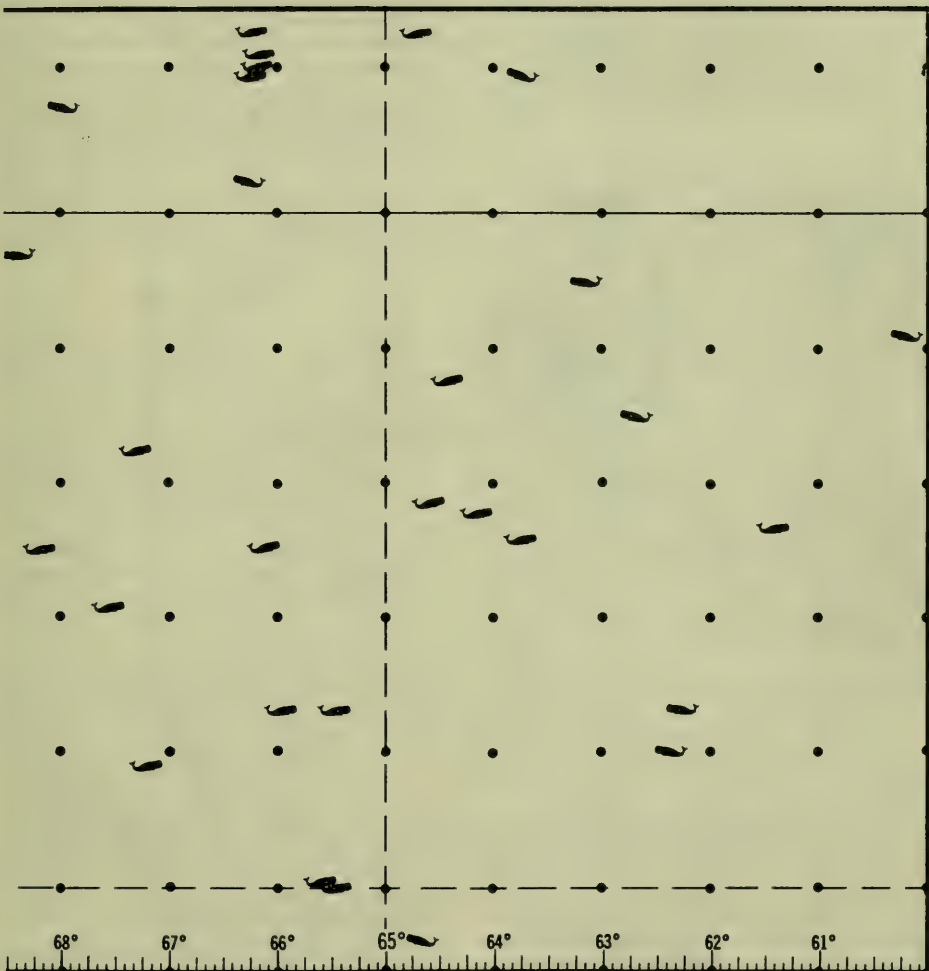
Since April 1966, numerous whales have been observed during more than 200 hours of oceanographic surveys conducted by aircraft, reports the U. S. Naval Oceanographic Office. About 90 percent of these observations were made in or near the western part of the Gulf Stream.

In the late 18th and early 19th centuries, whalers frequently hunted in an oceanic region they knew as the Southern Ground. This extended roughly from Philadelphia, Pa., to Cape Hatteras, N. C. It was bounded on the west by the coastline of the U. S. and on the east by about 60° W. Sea captains noted the Gulf Stream's effect on the distribution of whales in this area. The Southern Ground was less productive than other Atlantic areas, but it was popular because of its proximity to the New England whaling ports.

| Season | Number of Whales | Hours Observed | Whales Observed Per Hour |
|---|---|---|---|
| Winter (Jan., Feb., March) | 14 | 30.0 | 0.5 |
| Spring (April, May, June) | 52 | 43.6 | 1.2 |
| Summer (July, Aug., Sept.) | 42 | 100.0 | 0.4 |
| Fall (Oct., Nov., Dec.) | 24 | 52.7 | 0.5 |

The number of whales observed per hour of flight time is shown in table. The spring peak is attributed to the whales' northward migration through the Gulf Stream region to feeding grounds. As more data are obtained, the U. S. Naval Oceanographic Office will attempt to correlate the whale observation rate with environmental factors. (See the following pages for chart.)


Whale Observations




Along the Gulf Stream.

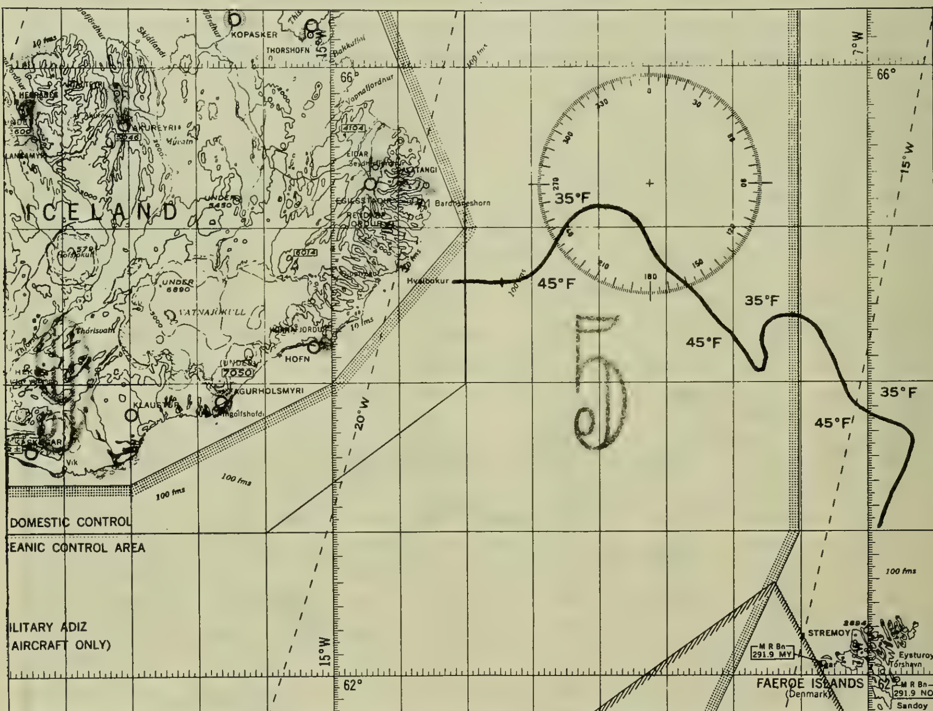
## Navy Tracks Herring Zone for Iceland

For the first time in oceanography, a plane was used to locate and track the zone where Atlantic and Polar waters meet in the Norwegian Sea. An instrumented research plane of the U. S. Naval Oceanographic Office located the zone southeast of Iceland (see chart) and tracked it to the northern tip of the Faroe Islands. The mission was flown to assist Iceland.

### Infrared Thermometers Used

To offset the approaching repetition of such losses, Dr. Steingrimur Hermansson, Head of Iceland's National Research Council, asked the Naval Oceanographic Office to use one of its airborne infrared thermometers to locate the zone between cool and warm waters.

Within 12 days, the oceanographic plane, flying out of Keflavik, Iceland, measured sea-surface temperatures around the entire island to a distance of about 100 miles. The




Robert Pickett, a participating scientist, said: "Herring, a fish upon which depends a sizeable portion of the Icelandic economy, feed in such zones. Last year this zone of demarkation between cool and warmer waters moved away from Iceland. Although herring were caught last year, the fishing fleet was so far from home that the catch spoiled on the trip back."

plane left the Washington, D.C., area on April 1 and returned on the twelfth.

## Scripps 'STYX' Survey Underway

The 180-foot, 825-ton "Alexander Agassiz" sailed from San Diego, Calif., April 2 on the STYX Expedition to the Central Pacific. Investigations are scheduled in the Hawaiian, Samoa, and Society Islands. The vessel belongs to the Scripps Institution of Oceanography, University of California, San Diego.

Dr. William A. Nierenberg, director of Scripps, said the research will cover several phases of deep-sea oceanography--mainly studies of water characteristics, topography, and sediments in the Central Pacific; the past and present animal life on Mid-Pacific seamounts and guyots (flat-topped seamounts); and the circulation around oceanic islands.

## U. S. Scientists Investigate North Pacific Polar Front

U. S. scientists are investigating a little-known oceanic boundary that stretches across the North Pacific from Japan to North America. Oceanographers call this boundary between cold Arctic waters and warmer subtropical water the Polar Front.

Scientists have known of this natural phenomenon for about 30 years, but the equipment necessary to study it only become available in recent years.

The study is a joint venture of scientists of the U. S. Department of Commerce's Environmental Science Services Administration (ESSA) and Oregon State University. It is being carried out from the "Surveyor," an ocean-survey vessel of ESSA's Coast and Geodetic Survey.

### 60 Miles Wide

Theodore V. Ryan, Director of ESSA's Pacific Oceanographic Research Laboratory in Seattle, Wash., and the expedition's chief scientist, estimated the Polar Front as 60 miles wide. Seasonal study of the Front was conducted in April 1968. It will be done again in September 1968 and in February of a future year. He said the study will cover a 3,000-mile stretch of the North Pacific, midway between the Hawaiian and Aleutian Islands, starting from a point about 1,500 miles west of California. In addition to 3 ESSA scientists and technicians, there are 5 scientists from Oregon State University, headed by Dr. Kilho Park, professor of chemical oceanography. Dr. Park is interested in the chemical properties and processes found at the Front.

### Expedition Purpose

Ryan explained: "One of the purposes of our expedition is to determine what happens to the water at the interface between these two dissimilar water masses. Oceanographers have long recognized that plant and animal life and even weather differ significantly on either side of the boundary. Some very significant changes occur in the waters when they meet. The chemical constituents of the water, such as phosphates, nitrates, silicates, carbon-dioxide concentrations, and many others, show a marked and abrupt change across the boundary. In addition, it isn't clear yet what happens to the resultant water type which is formed by the mixture of the two primary species." Some oceanographers theorize it ultimately sinks to intermediate depths and flows east and south.

Ryan said current meters and photography would be used to study the circulatory patterns at the bottom of the sea. The scientists will attempt to determine the main path of northward flow through the central North Pacific.

The Pacific differs from the Atlantic because the Bering Strait offers a very shallow, narrow passage between the two oceans--and there is no circulation of deep waters between the Arctic and the Pacific.

Ryan noted that one feature of the Polar Front is the distinct difference in weather on either side of the boundary. "The north side of the Polar Front is characterized by overcast skies and strong storm conditions, while the weather below the boundary is generally better."

## Foreign Fishing Off U. S. In March

### OFF ALASKA

Soviet: The number of fishing vessels decreased from about 130 in early March 1968 to about 100 at month's end. (In 1967, Soviet fishing and support vessels increased from about 130 in early March to over 150 by the end of the month.)

The Soviets discontinued their Pacific ocean perch fishery in the Gulf of Alaska, reduced a similar fishery off the Aleutians, but continued perch fishing south of the Pribilofs. Flounder fishing in the Bering Sea continued--but on a greatly reduced scale. Herring fishing south of the Pribilofs was discontinued by mid-month. King crab fishing in the eastern Bering Sea was one-third below last year's, but shrimp fishing in the central Gulf of Alaska expanded greatly during the month.

The Soviets fished Pacific ocean perch in 3 general areas: Gulf of Alaska, along Aleutians, and off Pribilofs. In Gulf of Alaska, the few remaining trawlers discontinued perch fishing in late March. (In 1967, they stopped ocean perch fishing there in mid-May.) In the eastern Aleutians, south of Fox Islands, a fleet of 10 medium trawlers and support vessels appeared early in March. Initial catches apparently were good, for by mid-month the number had tripled to nearly 30 vessels. Good catches, however, were short-lived; at month's end, fewer than 10 vessels remained. Most of this fleet moved south to the Pacific Northwest coast for hake fishing. In late March, about 5 stern factory trawlers and medium freezer trawlers moved to the edge of the Continentsl Shelf south and west of the Pribilofs seeking Pacific ocean perch. This area bisects the Bering Sea from Unimak Pass to Cape Navarin on the Asian mainland. The Soviets have fished perch intermittently for several years with few vessels for a short time.

Flounder fishing vessels in the Bering Sea decreased in number during the month. This fishery was almost at an end in late March, when only about 20 fishery and support vessels remained from about 70 in early March. (The pattern is similar to 1967's, when in late March the Soviets fished for flounder with about 30 vessels, and the fishery ended by mid-April.) Good catches of flounder were observed by BCF agents during one flight, but apparently this was not true for all vessels. Some medium freezer trawlers caught barely 5 metric tons per day and were transferred to ocean perch fishing off Aleutians. Catches of large stern trawlers sometimes were excellent: one vessel landed 1,800 metric tons in 45 days, or about 40 tons per day.

The herring fishery in the Bering Sea, which began on commercial scale in late January, was short-lived. By end of February, ice drifted into area and forced fleet (at its peak 30 vessels) to disband. Some large stern factory trawlers left for ocean perch fishing; others (mostly medium trawlers) went into cod fishing, and some remained on grounds a few days longer despite bad weather and ice because fishing was good. By mid-March, most fishing vessels left; only 3 exploratory research vessels of the Pacific Institute of Fisheries and Oceanography still criss-crossed the herring grounds off Pribilofs studying species to forecast its abundance in next year's season. Most vessels were large stern trawlers and medium freezer trawlers; both classes can freeze catches. Also, the Soviets temporarily used the newly constructed cannery "Aleksandr Kosarev," equipped for herring canning. Good catches necessitated the help of several refrigerated transports to take frozen or salted catches to Siberian home ports.

Pacific cod was taken by the Soviets north of Fox Islands (in eastern Aleutians near Unimak Island) in deeper waters of Bering Sea; this was confirmed by aerial surveillance flights of U. S. Coast Guard and BCF. The initial 12 vessels at end of February increased by third week of March to about 20 medium freezer trawlers; the number again decreased to about a dozen trawlers at end of March.

The king crab fishery in eastern Bering Sea is conducted by only 2 canneries: "Pavel Chebotniagin" and "Konstantin Sukhanov." Each is accompanied by 3 tangle-net setting medium trawlers and an exploratory research vessel. During last few years, the Soviets deployed 3 canneries and 10-11 trawlers for king crab fishing on U. S. Continental Shelf.

Shrimp fishing on Portlock Bank off Afognak Island (in Central Gulf of Alaska) began on limited scale in February 1968. It expanded greatly in March. The 2 medium freezer

trawlers, which were conducting more exploratory than commercial fishing in February, apparently found large concentrations of small Alaskan shrimp. In late March, they were joined by 13 more trawlers and 2 canning and freezing floating factories: "Aleksandr Kosarev" and "Korablestroitel Khlopotov," both recently constructed in Leningrad's Admiralty Shipyards. The two differ from the "Zakharov" class canneries engaged in king crab fishing. They are the largest of their type: 531 feet long. Although built in same shipyard as Zakharovs, this new version has 50 percent greater processing capability and employs 20 fewer persons aboard. Most processing lines are automated. New vessels have 12 processing lines (400 machines), plus special plants to salt fish and boil shrimp. Canning lines are completely automated and can produce 300,000 cans of herring (or 180,000 cans of tuna) each working day. Shrimp apparently are frozen and packed in small packages. A daily production of 40 metric tons of fish meal and fish oil also is possible. In 1967, the Soviets operated only 1 large Zakharov-class mothership with about 20 shrimp fishing medium freezer trawlers. This ratio was not particularly good because the processing facilities of one mothership could not keep up with excellent catches of medium trawlers. As a result, part of catch had to be frozen aboard freezer trawlers, cutting fishing time.

Japanese: Typically during early spring, more Japanese fleets arrive on fishing grounds off Alaska. This year, arrivals raised the number of vessels from 45 at beginning of March to about 110 at end.

Gulf of Alaska Pacific ocean perch fishing increased slightly with at least 6 factory trawlers so engaged by mid-March. Five were fishing principally in central Gulf of Alaska from off Yakutat Bay to south of Kodiak Island. The sixth factory trawler worked off southeast Alaska throughout month. About 12 factory trawlers (500 to 3,500 gross tons) fishing principally for ocean perch apparently were operating as independent units. They appeared in increasing numbers along edge of Continental Shelf in eastern and Central Bering Sea. A factoryship was fishing ocean perch along edge of Continental Shelf south of Pribilofs.

By late March, 2 more fleets, believed involving 55 accompanying trawlers--engaged principally in production of minced fish meat and fish meal and oil--joined a third fleet with 10 trawlers on proved pollock grounds north of Fox Islands.

By mid-month, the usual two Japanese king crab fleets arrived on accustomed fishing grounds north of Alaska Peninsula. One is accompanied by the usual 6 tangle-net handling trawlers; the other has 10 accompanying trawlers. The Japanese say the latter will place greater emphasis on fishing pots for both king and tanner crab this year. Apparently, this accounts for the extra trawler-type vessels with this fleet.

The increased efforts by long-liners in Gulf of Alaska continued through March. Sightings indicated there were at least 3 long-liners active off southeast Alaska, fishing principally for sablefish.

OFF PACIFIC NORTHWEST

Soviet: During March 1968, 20 different fishing and support vessels were sighted. During first 3 weeks, most were large stern trawlers but, in fourth week, when hake fishing began, 9 medium trawlers moved into waters off Washington accompanied by 3 large processing and transporting support vessels.

Soviets fished off Oregon during most of March (see table) and concentrated their vessels off Grays Harbor (Washington) when hake began to run.

Soviet Fishery Vessels Off Pacific Northwest in March 1968 (Including Duplications)

| Week Ending | Area | Type of Vessel | | | | Total |
|---|---|---|---|---|---|---|
| | | Medium Side Trawlers | Stern Factory Trawlers | Support Vessels | Research Vessels | |
| Mar. 7 | Wash. | - | 1 | - | - | 1 |
| | Oregon | - | 2 | - | 1 | 3 |
| | Total | - | 3 | - | 1 | 4 |
| Mar. 14 | Wash. | - | 1 | - | - | 1 |
| | Oregon | - | 1 | - | - | 1 |
| | Total | - | 2 | - | - | 2 |
| Mar. 21 | Wash. | - | 1 | - | - | 1 |
| | Oregon | - | 5 | 2 | - | 7 |
| | Total | - | 6 | 2 | - | 8 |
| Mar. 28 | Wash. | 9 | 1 | 3 | - | 13 |
| | Oregon | 2 | - | - | - | 2 |
| | Total | 11 | 1 | 3 | - | 15 |

Almost no information is available on Soviet catches in this area, but it is believed that most stern trawlers fished for ocean perch and other rockfishes.

Only one fishery research vessel was identified, "SRTM-8450," about 30 miles off Heceta Head in Central Oregon during early March; then she moved south and was sighted off California.

Japanese: Three vessels (2 stern trawlers and 1 long-liner) were fishing off Pacific Northwest, all off Washington. But only on the long-liner were fish observed: rockfish and sablefish.

OFF CALIFORNIA

Soviet: After an absence of about $2\frac{1}{2}$ months, the Soviets began fishing off California in mid-March with 6-9 stern factory trawlers. Most vessels were sighted in the northern part of California, above San Francisco. During last week, a supply tanker arrived off Point Reyes to refuel fleet.

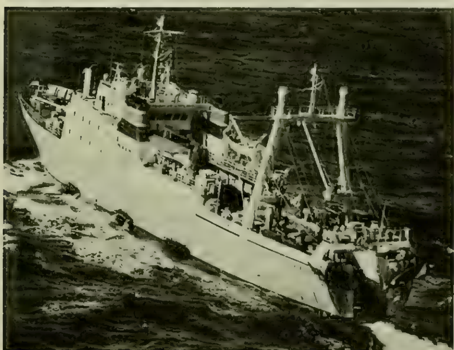


Fig. 1 - Soviet factory stern trawler "Peter Liziukov" was one of several recently constructed "Atlantik" class trawlers operating off U. S. Atlantic coast in March 1968.
(Photo: Charles L. Philbrook)

Two of the large trawlers were "Atlantiks," a new class of freezer trawler being constructed in East Germany. The first Atlantik deployed in the Pacific was the "Akustik." She began fishing off Pacific Northwest in November 1967, moved off California in December, and by January 1968 was sighted near Baranof Island in Gulf of Alaska. By mid-March, she was again fishing off California, but only for about a week. Then she was replaced by the "Aviator," another Atlantik just off East German construction slips. The new trawlers are being sent fishing directly from shipyards via the Panama Canal; their crews are flown from Far East to European Russia. They return to their Far Eastern home ports only after maiden trip.

The research vessel "Akademik Berg" (intermittently off California and Pacific Northwest during past 3 months) was sighted on March 21, about 20 miles west of Fort Ross, losing much oil. She was not reported off California later and it is presumed she headed north and possibly home for repairs. She was replaced in fourth week by a smaller exploratory medium trawler, the "SRTM-8450" of Pacific Institute for Fisheries and Oceanography in Vladivostok, whose mission was to find concentrations of rockfish.

OFF HAWAII

Soviet: The number of vessels fishing 200-300 miles north of the Hawaiian Islands increased to about 12 in first half of March. Catches were good. By end of March, however, the fleet had moved out. The species caught were the families Pacific dories "Zeidae" and alfonsinos "Berycidae." Excellent catches were taken at times: Several trawlers caught up to 70,000 pounds per fishing day several days in a row. The fleet used midwater trawls since ocean depth exceeds 2,000 fathoms.

OFF U. S. TRUST TERRITORIES

Soviet: It is believed the 4 medium trawlers tuna purse-seining off Caroline Islands are continuing.

IN GULF OF MEXICO AND
OFF SOUTH ATLANTIC

No foreign vessels were sighted fishing off the U. S. Atlantic coast south of Cape Hatteras (including Florida coast) or off U. S. Gulf of Mexico coast.

IN NORTH ATLANTIC

An estimated 170 foreign fishing vessels from the USSR, Poland, and Spain fished. Soviet vessels were most numerous; weekly sightings showed sharp increases from about 50 early in month to over 100 by month's end. In all, 125 individual vessels were sighted.

Twelve Polish vessels (2 stern trawlers, 9 large side trawlers and 1 factory base ship) and an estimated 30 Spanish pair trawlers also were sighted.

Widespread and frequent shifting of fleets between Georges Bank and Middle Atlantic occurred. As a result, surveillance flights were coordinated with both the First and Third Coast Guard Districts.

IN NORTHWEST ATLANTIC

Soviet: Early in month, only 5-6 Soviet vessels were scattered from south of Block Island, R.I., to eastern slopes of Georges Bank. By mid-month, a group of 12 stern trawlers was 60 miles south of Block Island. Moderate catches on board appeared to be red hake. Near month's end, a fleet of 47 Soviet vessels (mostly medium trawlers) was about 55 miles south of Martha's Vineyard. Moderate catches of herring were observed on board.

OFF MID-ATLANTIC

Soviet: Through March, large fleets fished primarily off New York and New Jersey. Early in month, 50-60 vessels were located southeast of Cape May, N. J.; mid-month, nearly 100 vessels. These were west of "no fishing" zone south of Long Island. Heavy-to-moderate catches observed on board were primarily herring.

The Soviets made good use of loading zones off Moriches Inlet, L. I., and Atlantic City, N. J. Once, 21 vessels (including several giant 15,000-gross-ton processing ships) were crowded into small loading zone off Long Island. The loading zone apparently was too small and several vessels were sighted in adjacent 9-mile contiguous zone. The Coast Guard notified Soviets they were within U. S. 12-mile zone--and their vessels departed immediately for high seas.

Polish: 5-6 vessels were seen fishing off southern New England and New York, frequently within "no fishing" zone. Catches were primarily herring. One Polish trawler, illegally anchored inside U. S. 12-mile limit, was so advised by Coast Guard of the violation and returned to high seas.

Spanish: An estimated 30 Spanish pair trawlers (see fig. 2) fished on eastern slopes of Georges Bank. These received attention in response to New England fishing industries' concern over the discarding of haddock witnessed by U. S. fishermen. It appears the Spaniards want large fish (cod) only and wash smaller fish overboard (see fig. 3.)

SOVIET VIOLATIONS OF U.S.-USSR MID-ATLANTIC BIGHT FISHERIES AGREEMENT

In March, 13 violations of the Agreement involving 13 individual Soviet vessels were observed. Eleven cases involved both trawlers and support ships anchored illegally outside the authorized loading zones. Two Soviet side trawlers were observed fishing within "no fishing" zone.

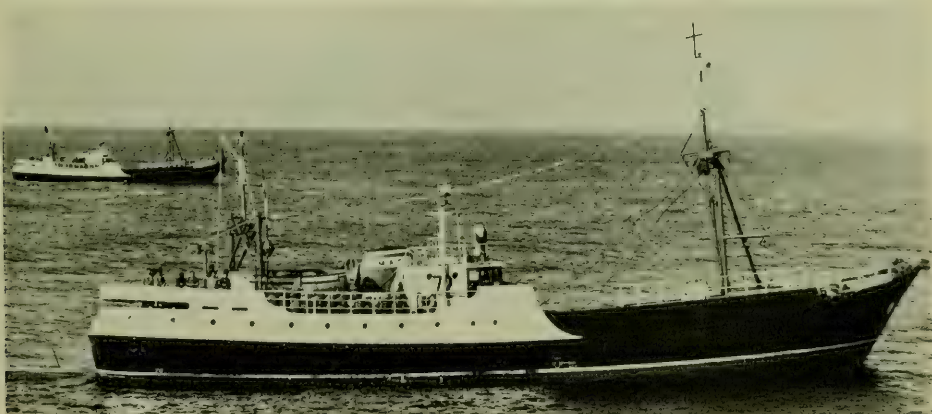


Fig. 2 - Spanish "Pareja" trawlers fishing on eastern Georges Bank in Feb. 1968.

Fig. 3 - Harvesting cod by Spanish "Pareja" trawler on Georges Bank in Feb. 1968. (Photos 2 & 3: Ralph C. Levie)

## BOARDINGS OF FOREIGN VESSELS IN NORTH ATLANTIC

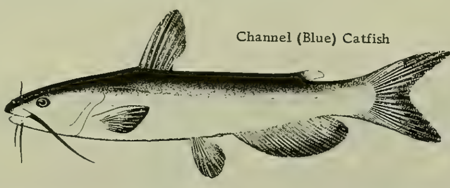
The Soviet repair tug "Uragan" towed factory stern trawler "Pallada" into Boston Harbor on March 2, 1968. The Pallada had nets caught in her propeller while fishing east of Cape May, N.J. Because of an approaching storm, permission was granted to enter protected waters of Boston Harbor. Both vessels were inspected by BCF Resource Management Agents.

The Polish trawler "Brda" entered a Philadelphia shipyard for boiler repairs on March 11, 1968. The vessel remained several days and was boarded by a Resource Management Agent.

The Soviet water tanker "Buguruslan" received permission to enter Philadelphia port on March 26, 1968, to load 700 tons of water for fishing fleets off U.S. Atlantic coast.

## THE CATFISH

Fifty million pounds of farm-raised catfish are expected to be harvested in 1970, and this will double again by 1972. The current average yield is 1,000 pounds per surface acre. More efficient operators obtain yields of 1,500 to 2,000 pounds per acre. In experimental trials, yields of 7,000 pounds per acre have been achieved. In any case, there is a good possibility that in the next 10 years the harvest of commercially cultured catfish alone will exceed commercial catches of all wild species in the Great Lakes.




Recent development of a mechanical dressing and skinning machine has greatly facilitated processing operations. Farm fish producers have formed processing and marketing organizations. Outside capital has been invested in catfish farming with an eye toward integrated production-processing-marketing procedures. An unfilled demand exists for the highly esteemed catfish in its traditional market area in the south-central United States. The succulent, white, meaty fillets and steaks from catfish are ideal for producing more products for new market areas.

The stage is set for commercial fresh-water fish farming to make a major contribution to the food resources of the United States. We in the Bureau of Commercial Fisheries are pleased to have contributed to the development of the blossoming industry. We expect to contribute even more significantly in coming years through research and technical assistance.

# STATES

## California

### 1967 ANNUAL REPORT ON FISH AND GAME ISSUED

In 1967, California's commercial fishery landed about 589 million pounds worth $77,000,000. The landings were below those of recent years. Tuna made up about half the 1967 landings. This was disclosed by Walter T. Shannon, Director, California Department of Fish and Game in his 1967 annual report.

The crab harvest was 10.6 million pounds, a slight rise from 10.4 million in 1966. Most were taken in northern California; only 390,000 pounds were landed in the San Francisco area. However, Shannon stated, 1967-68 is expected to be much better, "with some 2 million pounds being taken in the San Francisco area."

Shrimp landings were 1.5 million pounds; 1968's landings should be about the same.

#### Anchovy

Last season's reduction fishery landed 37,615 tons of anchovy; the live-bait fishery landed 6,691 tons. The Fish and Game Commission set a quota of 75,000 tons for the third experimental anchovy reduction season (1967-68). It was the same as the past 2 years.

#### Albacore Research

Research on albacore revealed that "the backbone of the fishery" are the 2- and 3-year-old fish. Shannon stated: "This means that the fishery could survive one weak year class but would be in trouble with two weak year classes in a row." His department has the knowledge "to predict this sort of thing before it happens."

#### Shrimp Surveys

Shrimp surveys show that the 1967 year class is one of the weakest in a dozen years. "We shall have to be careful not to overharvest shrimp in 1969," Shannon emphasized.

#### Salmon and Steelhead

In 1967, commercial salmon landings were 7 million pounds; they were 9.7 million in 1966; the 10-year average was 7.4 million. Salmon and steelhead spawning runs are below average, especially in Sacramento and American Rivers.

The State planted more than a million silver salmon in north coast streams in 1966-67. It released the first yearling king salmon in the San Joaquin system. It will stock 200,000 kings a year in this system in an attempt to restore the once-great runs.

## Alaska

### COAST GUARD AND BCF WRITE SAFETY BOOKLET FOR FISHERMEN

The U. S. Coast Guard and BCF have coauthored "Safety Notes for the Alaskan Fisherman." The authors note the urgent need for the publication: "Alaska has the unenviable distinction of having the worst water safety record of any state in recent years. Furthermore, a large percentage of Alaska's grim statistics are from the commercial fishing industries."

During 1966 and 1967, 99 commercial fishing boats over 20 feet long were lost. Nearly 1,800 accidents involving fishermen occurred. In 1966, 60 fishermen perished.

The booklet will be made available to Alaskan fishermen. A. K. Larssen of BCF's Alaska Region Exploratory Fishing and Gear Research Base worked closely with the Coast Guard in preparing it.

#### What Booklet Covers

Through case history, hypothetical case, photo and cartoon, the easy-to-read booklet throws a lifeline to the fisherman.

In "Saga of the F/V Highliner," a story fashioned to instruct, the authors tell how a skipper in crisis should have handled the situation. Its theme: "'When the water gets over your knees'--that's the time you should have already called for help! Many boats and lives have been lost from waiting too long before signalling for assistance."

A chapter entitled "Brass Tacks" reports that "the most frequent difficulty experienced by Alaskan fishing vessels is trying to occupy

a space already filled--by a rock! Although some rocks may not be charted properly, the vast majority of those which have been struck are properly charted!" It provides advice to keep the fisherman "in good shape."

The booklet contains safety information concerning fire, overloading, icing, weather, collision. An indispensable chapter to fishermen is "When All Else Fails"--the problem of survival.

The booklet also covers the daily routines--and injuries--of handling fishing gear and marine equipment.

* * *

UDALL CONDEMNS WATER POLLUTION CAUSED BY OIL OPERATIONS

To contend with the increasing water-pollution incidents caused by oil exploration in Alaska's Cook Inlet, Interior Secretary Stewart L. Udall has asked industry to cooperate in an emergency control program and in setting strict industry guidelines.

Secretary Udall said: "During recent months, I have received well-substantiated evidence that exploration and development activities in Cook Inlet have resulted in a recurring series of pollution incidents. Between June 1966 and December 1967, there were some 75 incidents of oil pollution in Cook Inlet reported by Federal and State Agencies responsible for the conservation of the natural resources of the area."

He added that pollutants included crude oil, mud sacks, garbage, refuse, engine oil, stove oil, and jet fuel. Some progress has been made in talks with industry officials, he noted, but the basic problem remains.

Secretary Udall cited as examples the damage sustained in commercial fishing with oil fouling nets and fish taken in nets. Also, 1,800 to 2,000 ducks were killed by one oil spill. In December 1967, a tanker colliding with a dock caused an oil spill of more than 1,000 barrels of oil over 20 miles.

Concerned About Future

Secretary Udall said: "I am concerned not only about the pollution problem in Cook Inlet but have even greater concern about the possibilities of similar consequences from the forthcoming exploratory and development programs in the Gulf of Alaska and Bristol Bay.

"Those areas are of even greater importance to commercial fisheries and wildlife. In fact, nowhere else on the North American Continent does the prospect of pollution from oil development pose such overwhelming threats to birds and other wildlife and to fishery resources."

Secretary Udall said he could not overemphasize his concern for the safety of fish and wildlife resources in the years ahead: "One gusher, one wrecked tanker, one broken pipeline, or one large spill--accidental or not--could cause lasting damage. In fact, no oil exploratory or development work should start in Bristol Bay until the industry can assure that its operations will be carried out without polluting the environment and without damaging fish and other acquatic resources."

* * *

SET QUOTAS FOR HERRING-SPAWN-ON-KELP FISHERY

During the past few years, the Alaska fishery for herring-spawn-on-kelp has grown to a $750,000 dollar business, reports BCF Juneau. This fishery occurs for a few minutes to a few hours at 3 places in southeastern Alaska. The kelp, with its burden of spawn, is picked by hand from small boats. It is dry salted in barrels for export to Japan. Competition is very intense because the price paid to fishermen may be $1 or more per pound and processing is very simple.

This year, new regulations require fishermen to register for a single area. A quota is set for each fisherman depending on the total number of registrants. These actions have reduced the "gold rush" atmosphere. However, it did not reduce significantly the number of fishermen or processors.

## Oregon

COHO SALMON RELEASES COMPLETED

The Oregon Fish Commission completed its annual coho salmon releases in April. Its hatcherymen released from 9 coastal and Columbia River hatcheries 8.7 million coho smolts, young fish ready to begin their seaward migration.

In addition to the smolts, which are fed in the hatcheries for about 14 months, more than 7 million small, unfed, coho were released. Most of these smaller fish went into Willamette River tributaries where the commission is attempting to develop a large coho run.

Spectacular Coho Season

The coho releases completed one of Oregon's most spectacular coho seasons. Sport fishing the length of the coast was the best ever; a record 300,000-plus coho were caught at the mouth of the Columbia. The ocean troll fishery landed a record 8.3 million pounds. The Columbia River gill net catch of 3.8 million pounds was the second highest since 1929.

Despite these record and near-record harvests, about 26,000 adult coho were hauled from commission hatcheries in tank trucks of the Fish Commission, U. S. Fish and Wildlife Service and Oregon Game Commission, and released into streams with natural spawning potential.

Another 92,000 returning coho were sold to commercial processors on bid. About 25,000 were provided to state and county institutions for food programs.

36 Million Eggs Taken

Commission hatcherymen took 36 million coho eggs. Eleven million were given to other fisheries agencies, including the Oregon Game Commission, U. S. Bureau of Sport Fisheries and Wildlife, and the Idaho, Montana, Alaska, California, Michigan, New York, and Minnesota conservation departments.

Eighteen million coho eggs were retained at Fish Commission hatcheries. The recent fry releases came from this stock. The remainder are being reared at the hatcheries. After culling and natural mortalities, about 10 million smolts will be released in early spring 1969.

* * *

## NEW DAM THREATENS CHINOOK RUN

Oregon Fish Commission director Robert W. Schoning said in April that no commercial fishing season for spring chinook in the Columbia River would be considered in the immediate future unless the prevailing fish passage situation at John Day Dam were drastically reversed.

The season was to remain closed until further notice. Without such action, the commercial season would have begun on April 27, the same as in 1967.

The Washington Department of Fisheries in the second half of April, closed sport fishing for spring chinook in the Columbia for Washington fishermen; the Oregon Game Commission closed it for sport fishing on the Columbia in Oregon. The Washington agency also delayed opening the commercial fishery on the Columbia until further notice.

Fish Passage Problems

Schoning said that he was expecting a relatively small run of spring chinook this year, and that those in the river already were experiencing extreme passage difficulties. The problem was caused by the newly completed John Day Dam between The Dalles and McNary Dams. The fish were not moving over the fishway at the new dam in satisfactory numbers.

Bonneville, the lowermost dam on the river, is 145 miles above the mouth. The Dalles Dam is 46 miles above Bonneville; the John Day Dam is 24 miles further upstream; McNary is 67 miles above Day.

The count at Bonneville of chinook moving up the ladders was over 59,000 fish through April 25. At The Dalles Dam, the count also was encouraging: 2,800 chinook over on the 25th for a season total of 33,000. But, Schoning stated, John Day Dam counts were extremely alarming--a total of only 1,620 chinook through April 25.

Although some time lag between passage at the dams was expected, something was drastically wrong at John Day Dam: thousands of fish that successfully negotiated The Dalles fishways were held up.

Corrective Measures

Oregon Fish Commission and Washington Department of Fisheries biologists and engineers worked closely with the Corps of Engineers to adjust fish-passage facilities. The number of chinook passing John Day increased somewhat later in April--but was still far below normal.

* * *

NEW FISH-MARKING METHOD APPROVED

A new method of marking hatchery-reared salmon by causing fluorescent rings to form in their bones has been approved by the U. S. Food and Drug Administration, reports Dr. Thomas E. Kruse, Oregon Fish Commission research director.

The technique mixes the antibiotic oxytetracycline into the food of young salmon being reared in the hatchery. A small amount is enough to lay down an identifying mark in the bones. When examined under ultraviolet light, the mark appears as a flourescent yellow band that stands out clearly against the bluish background of "normal" bone.

Method's Advantages

Among the method's advantages is that it does not handicap the fish, as may happen when fins are clipped or when metal or plastic tags are used. The oxytetracycline technique is also cheaper than other methods and does not require handling of the fish with the possibility of injuring them. Experiments have shown that more than one ring can be produced in the fish by feeding of the marking agent at intervals.

Flourescent Mark

To examine fish for the flourescent mark, a bone sample must be taken. A segment of backbone from the tail end is ideal. This is a relatively simple matter when adult salmon return to the hatcheries on the spawning run. The fish are dispatched prior to spawning, and there is little problem in removing a bone sample with a special bit mounted in a drill press. At fish-processing plants, bone samples should also be readily available since the tails are cut off and discarded in preparation of the salmon for canning.

Sampling the sport catch for the mark is different. Biologists have designed a special tool to remove a bone from the inside of the mouth. This does not mutilate the fish as removal of a section of backbone would. It should overcome any objection many fishermen would have to their catch being somewhat mangled--even for science.

Initial work in marking fish by feeding oxytetracycline was done by Douglas Weber and George Ridgway of BCF Seattle. The refinements in method and technical work necessary to win Food and Drug Administration acceptance were made by an Oregon Fish Commission crew under biologist Irv Jones of the Clackamas research laboratory staff.

Fisheries workers believe the new technique will measure more accurately the contribution of hatcheries to sport and commercial fisheries.

## Washington

AQUARIUM FACILITY
TO BE BUILT ON PUGET SOUND

The Oceanographic Commission of Washington State has appointed a committee to select a site and carry out the design, construction, and operation of a major aquarium facility on Puget Sound in King County. The new committee began work on May 7.

The sum of $3,000,000 in county general obligation bonding authority is available for the proposed aquarium. The County of King will contract with the Oceanographic Commission of Washington (OCW) and its State nonprofit corporation, the Oceanographic Institute of Washington to build and operate the facility.

Both Research and Entertainment

OCW members say that the proposed aquarium will be a modern mixture of public viewing and entertainment areas, working fisheries and oceanographic research facilities, many open to public--and a working tool of all State educational levels from secondary to university.

The committee has representatives of the Oceanographic Commission of Washington, University of Washington, State of Washington Departments of Fisheries, Fish and Game and Parks and Recreation, the City of Seattle, King County, U. S. Bureau of Commercial Fisheries, the Pacific Science Center, and Virginia Mason Research Center.

## Massachusetts

### BOSTON HARBOR POLLUTION CONFERENCE CALLED

Pollution in the Boston Harbor area has required closing more than 1,000 acres of shellfish beds, Secretary of the Interior Stewart L. Udall has announced. The halt in clam harvesting is causing an estimated annual loss of $256,000 to $1,400,000 a year. The shellfish beds were closed by Massachusetts because of bacterial contamination in the harbor waters.

The greatest source of water pollution in Boston Harbor is the discharge of municipal waste. About 460 million gallons a day of raw or partially treated sewage from the mettropolitan area are discharged through 2 major sewerage systems.

More pollutants are discharged into the harbor and its tributaries from boats, other water-pollution control plants providing inadequate treatment, and overflows from combined sewers carrying sewage and storm water.

The waste produce bad odors, stimulate excessive growth of aquatic plants, and make it dangerous to use the waters for swimming and boating.

#### Udall Calls Enforcement Conference

Sec. Udall has called a Federal-State enforcement conference in Boston on May 20 to cope with the pollution problem. He acted under a provision of the Water Quality Act of 1965. The provision gives him authority to start an enforcement action when he finds that substantial economic injury has been caused by inability to sell pollution-damaged shellfish in interstate commerce.

Representatives of Interior Department's Federal Water Pollution Control Administration and Massachusetts will attend.

* * *

### COMMERCIAL FACTORY TO PRODUCE FPC IS DEDICATED

A commercial plant to produce fish protein concentrate (FPC) was dedicated at the end of April in New Bedford, Mass. Governor John Volpe stated that the product "can give new employment and strong new hope to our lagging industry." Some observers saw its major significance as a potential lifeline for the world's hungry millions.

The Alpine Geophysical Associates plant will grind whole fish and extract their oil and water. It is reported that the remainder will have a pure animal protein content of more than 80 percent.

* * *

### BOSTON POND HAS TROUT FISHING

The fisherman on 63-acre Jamaica Pond in Jamaica Plain, Boston, can hear the sounds of the vibrant city and see a large apartment building to the north. But his attention is concentrated on the rainbow, brown, and brook trout--and the largemouth and smallmouth bass. The pond is within the Boston parks system.

Jamaica Pond is one of several city-surrounded trout-waters in the Northeast District of the Massachusetts Division of Fisheries and Game. Some others are: Plug Sound and Round Pond in Haverhill, Dug Pond in Natick, Forest Lake in Methuen, and Woburn's Horn Pond.

### CORRECTION

In "Mass Culture of Pink Shrimp and Pompano Studied by Miami U," April CFR, p. 13, a sentence in paragraph "Use of Warmed Water?" should have read: "When the cooling water is pumped out, it has increased in temperature by about 10° F."

# ARTICLES

## TRENDS IN THE ATLANTIC SEA SCALLOP FISHERY

By Julius A. Posgay*

Great changes have occurred in the Atlantic sea scallop fishery during the past 10 years. New boats for this fishery have been built in Canada; the U. S. fleet has declined. At first, landings went to unprecedented high levels but lately have declined. Prices dropped in the face of abundance, recovered, then rose dramatically when abundance declined moderately. This article explains the changes.

As recently as 10 years ago, the Atlantic sea scallop fishery was almost a monopoly of the U. S. Landings in 1957 were about 24 million pounds of meats, 88 percent of which was landed in U. S. ports by U. S. vessels. By 1962, landings had risen to 38 million pounds, but only 63 percent was made in the U. S.; the rest was landed in Canada. During 1966, landings were about 34 million pounds, and the U. S. share had dropped to 47 percent (table).

the fishing grounds. This rose to 16,000 in 1962 and 17,000 in 1966. What has changed is the relative amount of effort put in by fishermen of the two countries. The percentages are almost the same as those for landings: in 1957, 87 percent of the effort was contributed by the U. S.; in 1962, 68 percent; and in 1966, 47 percent (table). As Canadian vessels entered the fishery, U. S. vessels dropped out.

Landings of Sea Scallop Meats (Millions of Pounds); Effort (Thousands of Days Fished); Landings Per Day Fished, L/E (Hundreds of Pounds); and a Research Vessel Abundance Index (AVAI) for Georges Bank

| Area and Item | Years | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | '45-'59 | '60 | '61 | '62 | '63 | '64 | '65 | '66 |
| **Subarea 4:** | | | | | | | | |
| Landings | 1.0 | 0.2 | 0.4 | 1.4 | 3.2 | 2.8 | 2.0 | 1.2 |
| Effort (Can.) | 1/0.6 | 1/0.2 | 1/0.3 | 1/0.5 | 1/1.5 | 1/1.4 | 1/1.2 | 1/0.5 |
| **Subarea 5:** | | | | | | | | |
| Landings | 14.0 | 29.4 | 33.7 | 34.4 | 30.6 | 26.6 | 13.8 | 11.1 |
| Effort (U. S.) | 8.2 | 8.0 | 8.7 | 9.1 | 7.7 | 6.7 | 2.0 | 1.1 |
| Effort (Can.) | 0.6 | 2.3 | 3.1 | 4.6 | 5.9 | 6.7 | 5.7 | 5.5 |
| L/E | 17 | 29 | 29 | 25 | 22 | 20 | 18 | 17 |
| R.V.A.I. | N.A. | 112 | 92 | 98 | 46 | 40 | 34 | 48 |
| **Subarea 6:** | | | | | | | | |
| Landings | 4.3 | 2.8 | 2.9 | 2.2 | 1.7 | 2.0 | 23.6 | 19.8 |
| Effort (U. S.) | 1/2.8 | 1/1.4 | 1/1.4 | 1.8 | 1.1 | 1.2 | 7.6 | 6.9 |
| Effort (Can.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 2.3 |
| L/E | N.A. | N.A. | N.A. | 12 | 15 | 17 | 25 | 22 |
| **All areas:** | | | | | | | | |
| Landings | 19.3 | 34.3 | 38.0 | 38.0 | 35.5 | 31.4 | 39.4 | 34.1 |
| Effort (U. S.) | 1/11.0 | 9.4 | 10.1 | 10.9 | 8.8 | 7.9 | 9.6 | 8.0 |
| Effort (Can.) | 1/1.2 | 2.5 | 3.4 | 5.1 | 7.4 | 8.1 | 8.7 | 8.3 |
| Total effort | 1/12.2 | 11.9 | 13.5 | 16.0 | 16.2 | 16.0 | 18.3 | 16.3 |
| L/E | 16 | 29 | 28 | 24 | 22 | 20 | 22 | 21 |

1/Estimated.
N.A. = not available.

Fishing effort has only increased about 10 percent during the past 10 years. In 1957 the total amount of effort was 15,300 days on

Only about 10 percent of the Canadian catch is consumed in Canada. The rest is sold in the U. S. (fig. 1).

*Fishery Biologist, BCF's Biological Laboratory, Woods Hole, Mass. 02543.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 814

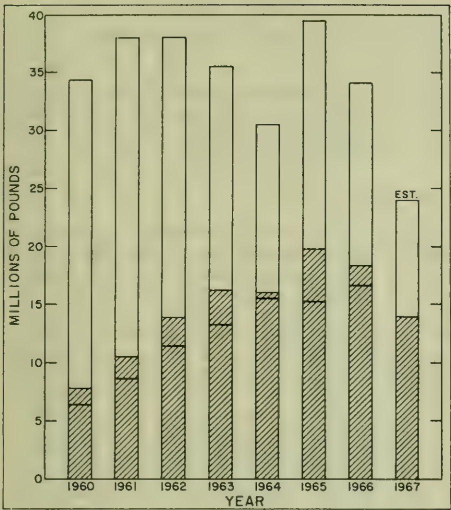



Fig. 1 - Annual landings of sea scallop meats 1960-67. The unshaded parts of the bars show United States landings and the shaded parts Canadian landings. The portion of the Canadian landings below the horizontal line in each bar shows the amount that was exported to the United States in that year.

## The Fishing Grounds

The sea scallop grounds extend from the Gulf of St. Lawrence south to the waters off the Virginia Capes (fig. 2). U. S. vessels have never fished the northern grounds and, until 1965, Canadian vessels had never fished the southern grounds. These northern (ICNAF Subarea 4) and southern (ICNAF Subarea 6) grounds have a history of providing only a small fraction of the total landings. During the years 1945-64, about 80 percent of the landings came from Georges Bank (ICNAF Subarea 5).

## Abundance

One should not regard Subarea 4 and Subarea 6 during the years before 1965 as containing large unexploited stocks of sea scallops. Both areas have extremely active otter trawl fisheries, and any news of good concentrations of sea scallops noticed by these vessels soon reaches the scallop fishermen. In addition, occasional surveys have been made by research vessels in Subarea 4 by Canada, and in Subarea 6 by the U. S.

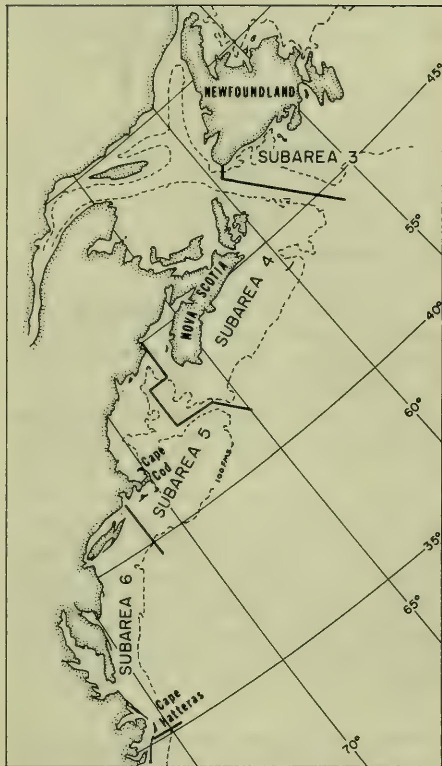



Fig. 2 - Chart of the ICNAF Subareas along the range of the sea scallop.

These investigations, as well as the analysis of the commercial landings from these areas, have all shown the same general situation. Wherever concentrations of sea scallops were found, they were less dense and covered a smaller area than those on Georges Bank and, almost invariably, they were composed of scallops of a single year class. The consensus has been that these grounds received only occasional spat fall and were of low productivity compared with the Georges Bank grounds.

The average annual landings per day spent on the fishing grounds (L/E) shown in table is not a good measure of abundance. It does not take into account the discards, the size com-

position of those kept, or the amount of time spent actually fishing--as compared to that spent shucking. It is, of course, a good measure of the relative success of fishing in one year compared with another, and on different grounds in the same year.

Georges Bank in Subarea 5 has been the most intensively fished sea scallop ground, and hence the most intensively studied. Until 1959, these grounds supplied about 19 million pounds of meats per year in about 12,000 days of fishing. About 10 percent of the effort was Canadian.

In late 1959, the true abundance of sea scallops on Georges Bank increased sharply because of the recruitment of the 1955 year class to marketable size. We have no precise quantitative idea of even the relative abundance of this year class as compared with other year classes, but fishermen with over 20 years of experience said that they had never seen anything like it.

Scallop catch rates immediately rose sharply. Boats that had been reporting landings of about 1,700 pounds per day began to report 3,500 and even 4,000 pounds. The high average catch rate of 2,900 pounds per day on Georges Bank continued during 1960 and 1961. It was at this time that the Canadian offshore scallop fleet began to expand (see table), partly as a result of the extremely good fishing--but also because of economic, social, and political factors in Canada.

Since 1959, annual recruitment has been nearer "normal" levels, with perhaps even a few very poor years. Our estimates of pre-recruits are not good; small scallops do not seem to be available to any of the sampling gear we have tried. The abundance index of our research vessel--the number of scallops larger than 70 mm. taken per 10,000 square feet dredged--declined from 112 in 1960 to 34 in 1965. Catch-per-day figures declined similarly.

An unprecedented increase in abundance of sea scallops appeared in Subarea 6 in 1965. Samples from the commercial landings were composed almost entirely (over 95 percent) of the 1961 year class. Both fleets shifted a large part of their effort from Subarea 5 into Subarea 6 (table) and landings rose from 2 million pounds in 1964 to 23.6 million in 1965. Fishing in Subarea 6 continued to be good in 1966; it was again supported largely by the 1961 year class, although the 1962 year class also showed up in respectable numbers.

### 1967 and Beyond

Conditions seem to be improving in Subarea 5. The research vessel abundance index, which reached a low of 34 in 1965, rose to 48 in 1966 and 63 in 1967. The stocks of Subarea 6 seem to be reverting to the pre-1965 condition. There is no evidence of a large 1963 year class, and vessels fishing there seem merely to be cleaning up the remnants of the 1962 and 1961 year classes. Catch rates in the first 9 months of 1967 were down to 1,600 pounds per day, compared to 2,100 in the first 9 months of 1966.

Good data on 1967 are still scarce, but the data available seem to indicate that total landings in Subareas 5 and 6 will be about 24 million pounds--about 10 million landed in the U. S.--compared with 34 million in 1966. About half the trips covered by interview through October 1967 still reported fishing in Subarea 6, but it was likely that most would shift their efforts back to Subarea 5 in the latter part of the year.

The size of the Canadian fleet seems to have stabilized, but there is no evidence that it will decline much. It is difficult to predict what will happen in the U. S. fleet. One reason for its decline has been the high abundance and good prices paid for yellowtail flounder; a second may be a shortage of men. Flounder fishing requires only 5 or 6 men, but scallopers need at least 11. Many boats that converted to flounder fishing might have been expected to go back to scallop fishing when the exvessel price rose. They may not be able to find the extra men, however, or the present low catch rates might discourage them--unless exvessel prices remain at the high levels of early 1968.

# COMPETITION FOR AQUATIC ENVIRONMENT

By Dr. Roland F. Smith*

Every day millions of Americans find their existence a little more complicated and unpleasant--even endangered--because of the direct or subtle effects that come from competition for the three primary resources--land, water, and air. Our technologically oriented and affluent society, with its pressures and demands on natural resources, has drastically changed many environments beyond recognition and, in some cases, to the very limits of human tolerance.

Quite literally, every corner of this country has been subjected to environmental change, much of it not even anticipated only two decades ago.

Because of environmental loss and degradation, and because of the many demands for specific environments and their associated resources, there will not be enough of some space and some resources for all. Indeed, our commercial fisheries are already affected by the competition that results--competition for environmental quality, space, and for the fish themselves.

Our high seas fishing fleets find competition from other nations increasing each year and, more recently, even our traditional coastal fisheries are being threatened. As critical as this competition may be, generally speaking, we have been more successful in compromising our conflicts with foreign fishing nations than we have been in solving problems at home.

## Competition for Estuarine Areas

Nowhere is competition for environment and associated resources more acute than in our estuarine areas. These are most threatened by population pressures and technological advances. Their fate has been one of steady deterioration and destruction. Relatively few people fully comprehend how vital our estuarine areas are to the Nation, how varied and complex are man's activities here, nor what their total impact is on the economic and social lives of our people.

Estuarine areas are bounded by land on the one side and ocean on the other. Their exact boundaries are difficult to delineate for they are a complex blending of earth, air, and water; they are a continuous band--a buffer zone--around our coasts, sometimes extending for hundreds of miles either into the land or the ocean. They constitute a variety of environmental systems in a complex interrelationship we are only just beginning to understand. Most of these estuarine areas are extremely productive of a variety of life. They exceed by severalfold the organic production in the richest of farm lands because they are a remarkable system for the containment and efficient utilization of the essential building blocks of organic matter--minerals, water, and sunlight. Ironically, the very forces which make estuaries such efficient nutrient traps also make them effective silt traps and giant septic tanks.

The Bureau of Commercial Fisheries is interested in estuarine areas because about 65 percent of our commercial fishery resources, by volume or value, consist of species which spend at least a portion of their life cycle in the estuarine environment. They support 7 of our 10 most valuable commercial fisheries. Among the 9 important groups of species which are canned, 6 are dependent on the estuarine environment.

## Estuaries Produce Significant Amount of Oxygen

Incidentally, there may be a more compelling reason for preserving our estuarine areas than that of providing seafood, recreation, hurricane protection, and natural beauty--as important as these may be.

Scientists are becoming increasingly concerned about the rate with which we are using up oxygen in our atmosphere. Indeed, recent estimates suggest that if man is to survive on this planet he will soon have to stop burning fossil fuels. Nearly all of the oxygen in our atmosphere is produced by plants through

*Assistant Director for Biological Research, BCF. Presented at meeting of National Canners Association, Atlantic City, New Jersey, Jan. 22, 1968.

photosynthesis. It is estimated that perhaps as much as 70 percent of this oxygen is produced by microscopic plants (plankton) which live in the ocean.

A recent estimate suggests that the United States is using up more oxygen than our land mass is producing. This means that the United States is already dependent on oxygen being produced by marine plants or on other land masses. A significant amount of oxygen produced in the world oceans may come from estuarine and coastal waters. If we destroy the natural systems that permit such abundant marine plant growth, we may be seriously reducing the total world production of oxygen.

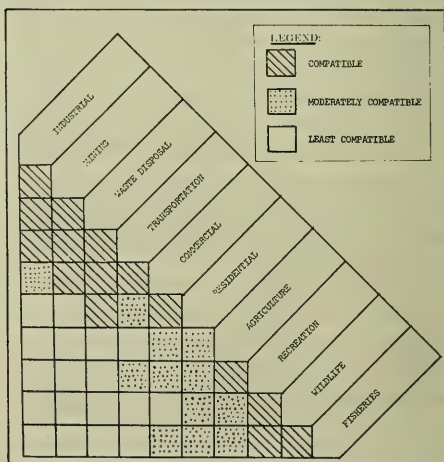
With all these demands on the Nation's coastal and estuarine systems, it is not surprising that they have become arenas where many of our basic philosophies and social institutions clash--where national, State, local, and private interests continually battle for recognition and control. However, there is increasing evidence that the public is getting fed up with the rampant environmental decay and rape of these valuable areas. Responsible administrators, scientists, and legislators are showing increasing concern with confusion that leads only to more chaos. The mass dissatisfaction that this reflects and amplifies may slowly help to evolve a public ethic and a recognition of the need for changes in philosophy and in governmental structures and responsibilities. Certainly, in the face of accelerated demands on coastal areas, we must consider how they can be better managed. But, who is to decide how a given area will be used? And how do we apportion the needs of the many competing and conflicting uses?

Ultimately, many estuarine areas will be administered as regional units, possibly as parts of large river basin complexes. This concept is gradually becoming recognized as perhaps the only logical approach to sound management of coastal areas. Zoning, in time or space, will become a common practice in most estuarine systems.

## Impact On Commercial Fisheries

How may we expect our commercial fisheries to thrive under a more controlled and intensified management of estuaries and coastal areas? Surely this will be more acceptable than no controls or uncoordinated local actions. However, the problem of justifying the continued existence of specific commercial fisheries will be increasingly difficult in many areas in the face of uses with higher economic or social values. Commercial fishing interests must recognize that they are going to have a tough selling job in many cases. Promotion programs should not only be designed to sell fish, but to sell the public on how they stand to gain by supporting a strong commercial fishery in coastal areas.

Commercial fishing interests must work actively not only with those whose uses of estuaries and coastal areas are compatible, but to willingly seek for compromises with those whose uses may be only moderately conflicting. By joining forces with recreationists, nature lovers, hunters, sports fishermen, planning groups, civic associations, and even waterfront home owners, we have allies with many common goals (see Figure). Thus, we represent a much stronger force against those who would seek to completely destroy our valuable estuarine living resources. There are many excellent examples of how industry support, even leadership, can be especially effective at the local and State levels.




Compatibility of uses in estuarine zones.

## Responsibilities of U. S. and States

A primary role of government--State and Federal--is to determine what we have, what it is worth, and how we can take care of it. Those agencies with responsibilities for man-

agement of estuarine fishery resources have specific responsibilities, which collectively include 7 major areas of effort:

1. Inventory all estuarine areas showing their condition and potential for supporting valuable fishery resources, what is happening to such areas, how they are being threatened, and what estuarine-associated fishery resources are present.

2. Acquire more specific knowledge about the life histories and environmental requirements of estuarine-dependent species.

3. Expand fundamental research in estuarine systems to include studies in productivity, hydrology, nutrient circulation and transfer, species interaction, and biological indicators of environmental change.

4. Develop a sound basis for determining the economic benefit from natural estuarine areas and their living resources.

5. Eliminate institutional barriers that prevent sound and equitable management of estuarine areas.

6. Develop sophisticated techniques to predict effects of proposed environmental alterations on fishery resources.

7. Develop more sophisticated estuarine husbandry programs, including techniques for increasing fish production by alteration of currents, mitigating effects of environmental alterations, controlled use of water products, control of diseases and predators, and development of genetic studies more suited to moderately disturbed habitats.

Generally speaking, efforts to date have not been adequate, but the problem has been recognized and some effective programs are underway. I am convinced that with increased knowledge, and supported by informal public opinion, we can maintain and perhaps even increase production of estuarine fishery resources. I am also convinced that commercial fishermen can compete effectively for many of these resources, and commercial fishing will be an integral part of most plans for managing coastal areas.

## ANTARCTICA'S MICROBIAL LIFE

Studies of Antarctica's microbial life are expected to provide information useful in developing life detection equipment for automatic landing devices planned for Mars.

Life in the form of algae and bacteria has been located in a dormant stage at temperatures as low as -47° F.

These microorganisms, dormant during the winter months, have been discovered about a foot beneath the surface in the volcanic soil of Antarctica's ice-free Taylor Valley. They become active only with the summer flow of run-off water from the glaciers located in the mountains above the valley. Algae, which require sunlight as their source of energy, are believed to exist in a dormant stage at temperatures below -60° F. (Reprinted with permission from "Science News", weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

# U. S. AND JAPAN CONDUCT SALMON RESEARCH IN COOPERATIVE CRUISE

By Robert R. French*

The Bureau of Commercial Fisheries (BCF) and the Japanese Fishery Agency have pooled their resources in a cooperative research cruise underway this spring in the North Pacific Ocean. The two nations and Canada are treaty members of the International North Pacific Fisheries Commission (INPFC). Each signatory is engaged in research on fishery resources of common interest for effective utilization and conservation.

Fig. 1 - BCF's "George B. Kelez."

The vessels participating in the spring cruise are the BCF Seattle Biological Laboratory's R/V "George B. Kelez" (550 tons) and the Japanese research vessels "Wakashio-Maru" (150 tons) and "Hokko-Maru" (220 tons)--all veterans of research in North Pacific waters. The George B. Kelez left Seattle on April 2 and will return in early July. The Japanese vessels reached the fishing grounds in late April and will stay until early June.

## Purpose of Cruise

The purpose of the cooperative cruise is to investigate the distribution of salmon and the associated oceanographic features south of the Aleutian Islands; the hypotheses concerning the relation between the distribution of salmon and their environment are being tested. Emphasis is on the distribution and migration of sockeye salmon from Bristol Bay in relation to the Alaskan Stream and central Alaskan Gyre. The migration routes of these salmon and surface currents are illustrated in figure 2.

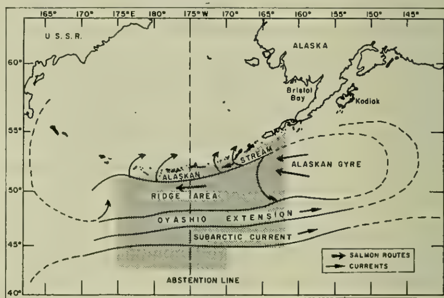



Fig. 2 - Salmon migration routes and surface currents of the study area (shaded) in the central North Pacific Ocean.

Under INPFC provisions, Japan (and her mothership fishing fleet) agreed in 1953 to abstain from fishing for salmon east of long. 175° W. Since then, however, we have found that sockeye salmon bound for Bristol Bay migrate past the abstention line. We hope that research in this area will add to our knowledge of the migration processes--and enable us to forecast the proportion of the run available to the Japanese fishery each year.

Cruise tracks of the vessels are illustrated in figures 3 and 4. The two Japanese vessels are collecting data on fish distribution in the western part of the sampling area; the U. S. vessel is collecting oceanographic data for all areas, as well as fishery data on the eastern section.

## Fishing Gear

Fishing gear are gill nets. The U. S. vessel is fishing a basic string of 32 shackles (2.9 kilometers or 1.8 miles) with five mesh sizes ($5\frac{1}{4}$, $4\frac{1}{2}$, $3\frac{7}{8}$, $3\frac{1}{4}$, and $2\frac{1}{2}$ inches--133, 115, 98, 83, and 63 mm.), stretched measure. The Japanese vessels are fishing a basic string of either 50 tans (2.5 km.) or 100 tans (5.0 km.)

*Fishery Biologist, BCF Biological Laboratory, Seattle, Wash. 98102.

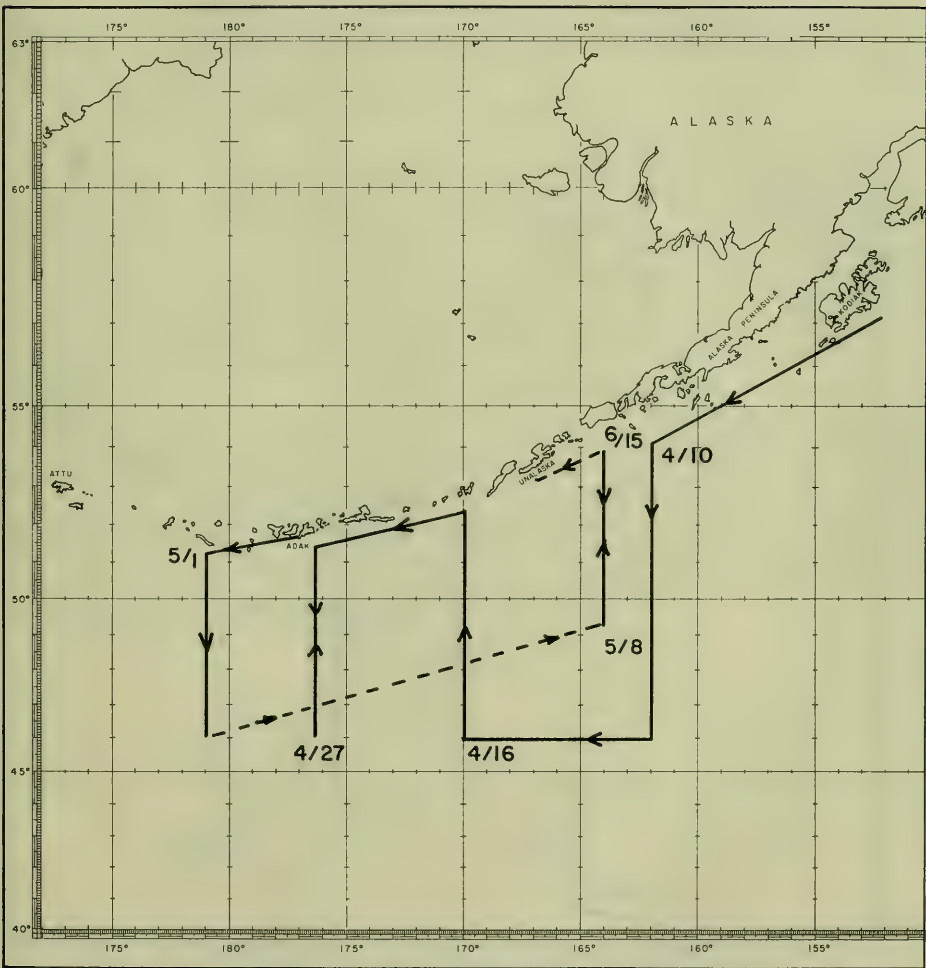



Fig. 3 - Cruise plan of R/V George B. Kelez, spring 1968.

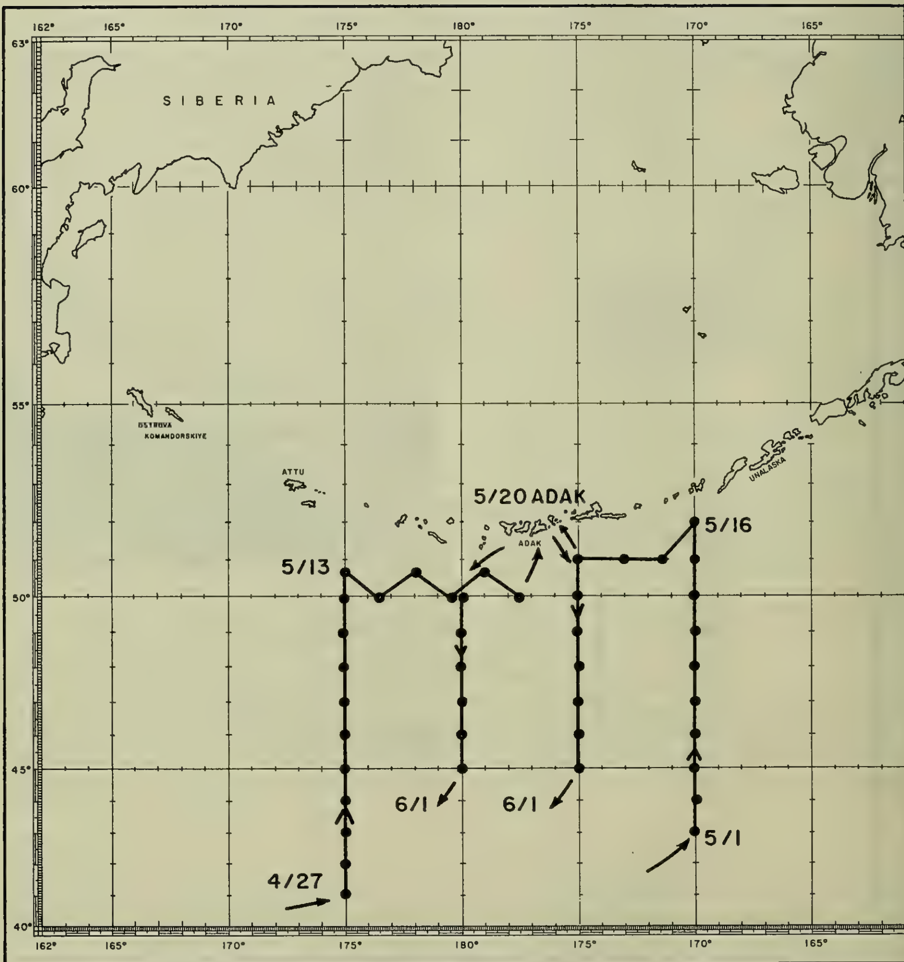



Fig. 4 - Cruise plans of R/V Wakashio-Maru and Hokko-Maru, spring 1968. (From Japanese Fishery Agency)

consisting of five mesh sizes (55, 72, 93, 121, and 157 mm., or 2.1, 2.8, 3.6, 4.7, and 6.1 inches). Data collected at each fishing site include catch by species for each mesh size, lengths of salmon, and scale samples from each fish; the U. S. scientists also are collecting blood samples and pituitary glands from sockeye salmon. Scales are used to determine age; scales and blood samples will be used to study area of origin of the salmon. Pituitary glands are used in studies of maturation schedules.

Oceanographic Study

Oceanographic observations by the R/V George B. Kelez are being taken to determine the location and magnitude of currents, the extent and location of boundaries, and hydrographic features of water masses. STD (salinity, temperature, depth data-sensing system), Nansen casts, and bathythermograph observations are being taken along all cruise tracks. Biological observations include zooplankton tows and studies of primary productivity in accordance with the observed distribution of physical properties.

Temperature and salinity are being recorded to depths of 1,500 m. along each principal cruise track. Shipboard data processing includes tabulation of temperatures and salinities at standard depths, and plotting of vertical sections of temperature and salinity along the cruise tracks.

Primary Productivity

Solar radiation and flourescence of sea water will be recorded continuously during April, May, and June aboard the George B. Kelez. Water samples from the surface are being drawn three times each day for nutrient and chlorophyll analyses; Secchi disk depth and surface primary productivity are being measured at least once daily. Van Dorn bottle casts to 200 m. for productivity, nutrient, and chlorophyll determinations are being made as time permits.

Zooplankton

Zooplankton are being sampled for estimation of standing crop and determination of species composition. The zooplankton populations are being sampled by hauling a 45-cm. net vertically from 150 m. to the surface. All tows are in duplicate, and all are completed during hours of darkness. Tows are made at each fishing station, or each night during the cruise when not on a fishing station. Samples are being preserved in formalin and will be returned to Seattle, Wash., for analysis.

Daily Communication Between Vessels

Daily communication between the Japanese and U. S. vessels and with the Seattle Biological Laboratory permits coordination of the research and selection of fishing stations on the basis of water mass. The efforts of the three vessels in this common study are expected to contribute substantially to an understanding of the relation between the distribution and migration of salmon and their environment.

# PARACHUTE-TYPE SEA ANCHOR

By Fred W. Hipkins*

BCF has tested a new parachute-type sea anchor designed to improve the safety of vessels during stormy weather. The anchor recently became available commercially. BCF tested the new safety device in offshore waters near Cape Flattery and in the Strait of Juan de Fuca, Washington, during cruise 92 of the exploratory fishing vessel "John N. Cobb."

Called "Luck Anchor," it comes in two types and several sizes. Basically, it is a parachute configuration having shroud lines reinforced to prevent tearing from the canopy in heavy seas. Weights are also used in some models to prevent rotation. A control line connected to a buoy, which in turn is connected to the crown of the canopy, allows the canopy to collapse when hauled back. It can be launched and hauled back by two persons. The "Luck Anchor" opens automatically after the buoy line and towline have been payed out. The drifting vessel pulls on the towline to open the chute. Within 10 minutes after launching the anchor, the vessel will turn with the bow facing into the wind and waves, and remain in that position until the anchor has been hauled. The anchor is repacked wet.

## F-Type Anchor

The F-type anchor (fig. 1) was designed to check the drifting speed of a vessel and is used by Japanese fishing vessels when fast drifting is undesirable. In the Strait of Juan de Fuca, with wind velocity steady at 26 knots, the F-type anchor reduced the drifting speed of the John N. Cobb from 2.6 knots to 0.3 knot. It

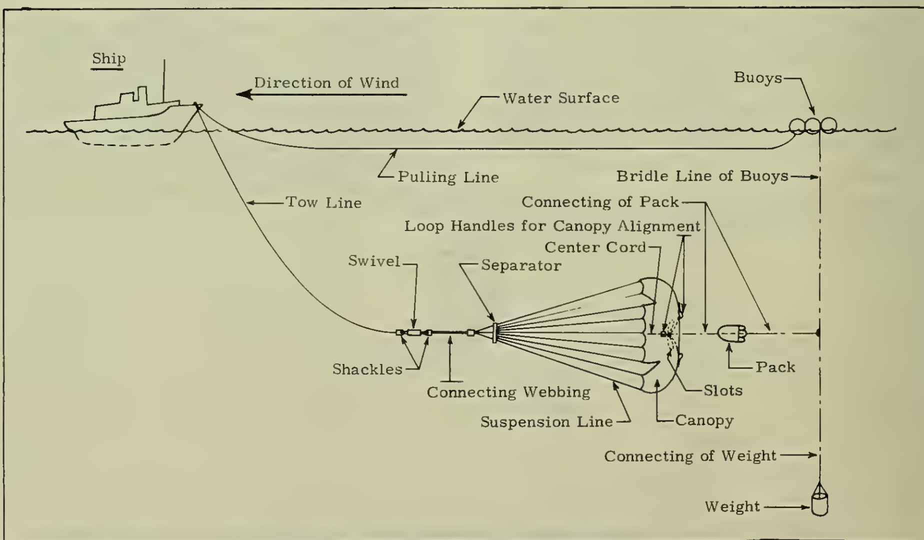



Fig. 1 - General arrangement of Luck-Anchor F-type.

*Fishery Methods & Equipment Specialist, Exploratory Fishing and Gear Research Base, Seattle, Wash.
Note: Equipment Note No. 24.

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was also tested in offshore waters in winds that forced other fishing vessels back to harbor.

PS-Type Anchor

The PS-type anchor (fig. 2) was designed to keep the bow of the vessel into the wind and waves while drifting at night, or when a vessel breakdown occurs in foul weather. In offshore waters near Cape Flattery, we tested models PS-70 and 50, in addition to the F-140, in winds of 38 knots gusting to 63 knots. When the wind gusted above 38 knots the bow of the John N. Cobb would swing away from the wind direction, and 2-3 minutes were required to reestablish the bow into the wind. After additional lines totaling 400 feet were payed out, the swinging motion nearly ceased. Had the towline been bridled through both the port and starboard chocks--causing a straight pull on the bow--this motion might not have occurred. Several times, the lines were changed from the bow to the stern, resulting in the stern being held into the wind and waves. During all the tests, the rolling of the ship was greatly reduced and the crew and staff were well pleased with the anchor's performance.

Towline Tension Measured

We measured towline tension, of the types and sizes tested, under various wind velocities and towline lengths. Generally, the amount of tension increased as the towline was lengthened. For example: using 300 feet of towline with wind velocity at 40 knots, the tension was 1,000 pounds; with 400 feet of towline and the same wind velocity, tension was 2,000 pounds. Using the PS-50 anchor, the minimum amount of tension recorded was 900 pounds at wind velocity of 26 knots. With the F-140, maximum tension was 4,000 pounds at 63 knots. The PS-70 appeared to be the best size for the John N. Cobb, which is 93 feet long, 25 feet in beam, and draws 10.6 feet. An additional anchor, the F-220, was aboard but not tested. From favorable results of those anchors tested, the F-220 would appear suitable for vessels larger than the Cobb.

According to the manufacturer, Nippon Rayon Company, Ltd., Tokyo, who supplied the anchors for testing, "Luck Anchors" will soon be available in all fishing and boating areas of the United States.

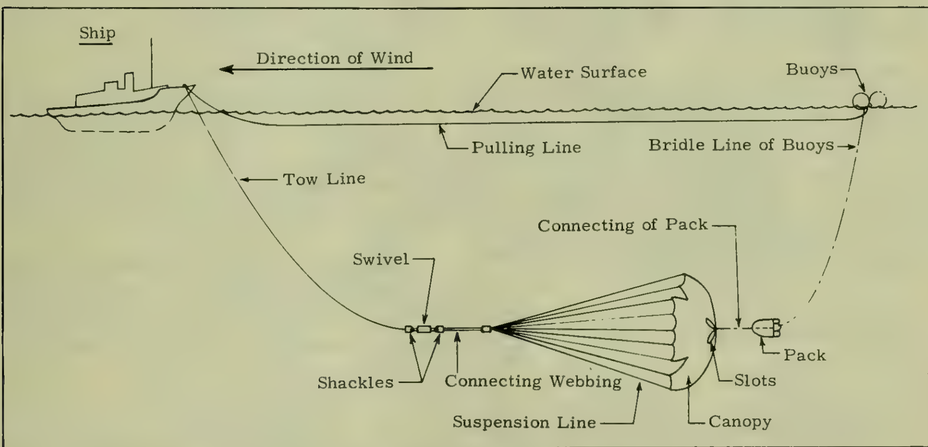



Fig. 2 - General arrangement of Luck-Anchor PS-type.

# INTERNATIONAL

## Report on Food From the Sea Issued by UN

The United Nations has published a large study of the sea's resources. The first part is entitled, "Food Resources of the Sea Beyond the Continental Shelf Excluding Fish." It was prepared for the UN Economic and Social Council by C. P. Idyll, Institute of Marine Sciences, University of Miami, Coral Gables, Florida.

The second part covers minerals and was prepared jointly by Frank Wang, Marine Geologist of the U. S. Department of the Interior's Geological Survey, and the UN Secretariat.

The report on food resources assesses the use of food from the sea to help feed the world's rapidly increasing population. It weighs the use of plankton, squids, whales, seals, sea lions, and walruses. It looks at the promises and limitations of aquaculture. It outlines the research required to exploit the open sea efficiently. And the report makes clear: "At present, the chief problems of obtaining more food from the sea revolves around the cost of the extraction."

The following is a condensation of major parts of the food resources report:

The Plant Plankton

Plants make up the largest part of the living material on land and in the sea. On land, plants provide much greater amounts of human food than do animals; the opposite is true for the sea. The amount of sea plants is much greater than that of land plants. But, the UN report says, "sea plants are different from those on land, and the differences render them much less useful to man directly."

Land plants are relatively large and can be transformed easily into "edible and palatable food" for man and for the large herbivorous animals that man eats. Most sea plants are "extremely small, one-celled individuals which usually cannot be seen let alone harvested readily." Altogether, these plants form a great amount of living substance--but they are spread over the vast ocean and so are hard to harvest. Because these plants are very small, the typical marine herbivore also is very small. "The grazers of the sea that serve to transform plant substance into meat, drift in immense clouds in the water. These drifters are collectively called plankton."

The report evaluates the possible use of plant plankton: "The plants of the ocean are so small that they would be hard to harvest; they sometimes have toxic qualities that would make them unpleasant if not actually dangerous to eat; and most of them possess harsh shells. The prospects of using planktonic plants as human food are poor."

The Animal Plankton

The most numerous and important plankton animals are the crustaceans, especially the copepods and euphausiids. "The copepods are the chief grazers of the sea, devouring plants and converting their substance into animal tissue. Then, in turn, they are eaten by fishes, sea mammals and birds."

The euphausiids are usually larger than the copepods. One principal species of the euphausiids is the Euphausia superba, $1\frac{1}{2}$-2 inches long, better known as "krill." There are fantastically large amounts of this animal in the Antarctic.

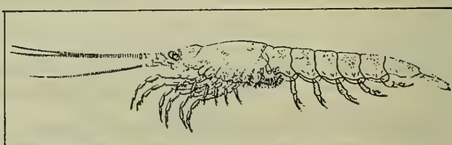


Fig. 1 - Krill.

As for the value of the animal plankton as human food, the report states: "Copepods, euphausiids and other crustaceans in the plankton are rarely poisonous or distasteful, and their shells are usually so soft that they offer no major problems in human consumption, although the proportion of shell to meat is higher than in the larger crustaceans such as shrimp and crabs."

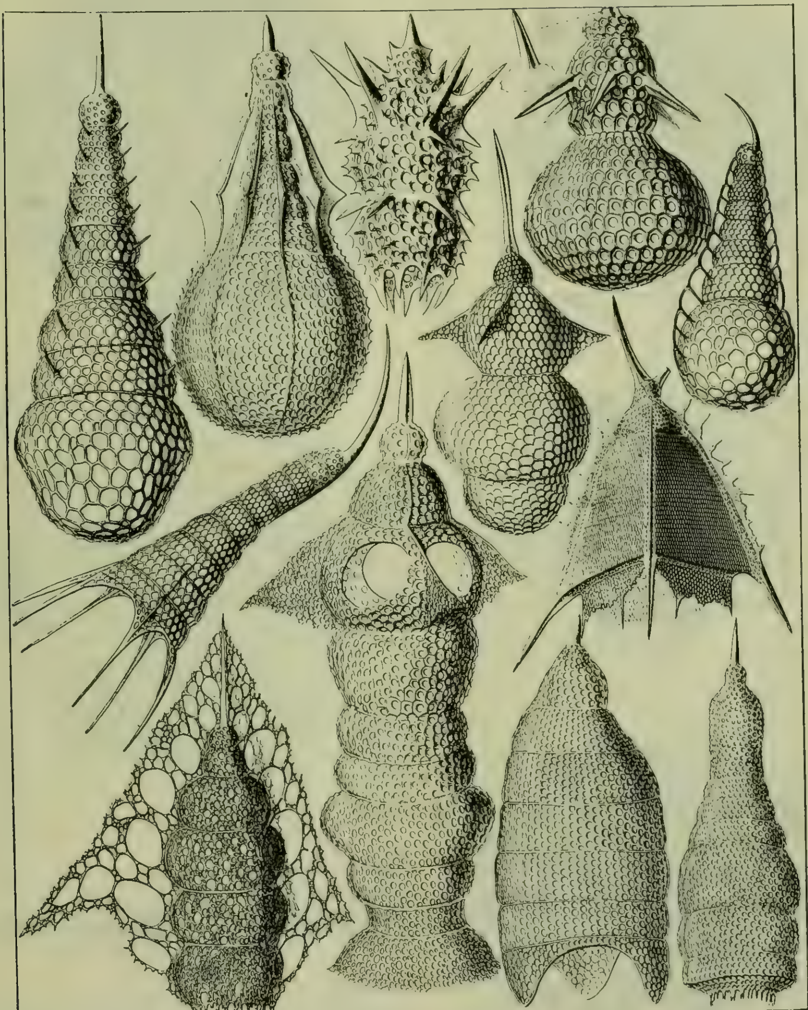


Fig. 2 - Skeletons of radiolarians magnified 200-500 diameters. Radiolaria are single-celled animal organisms found among plankton. ("The Voyage of H.M.S. Challenger": Radiolaria, plate 75)

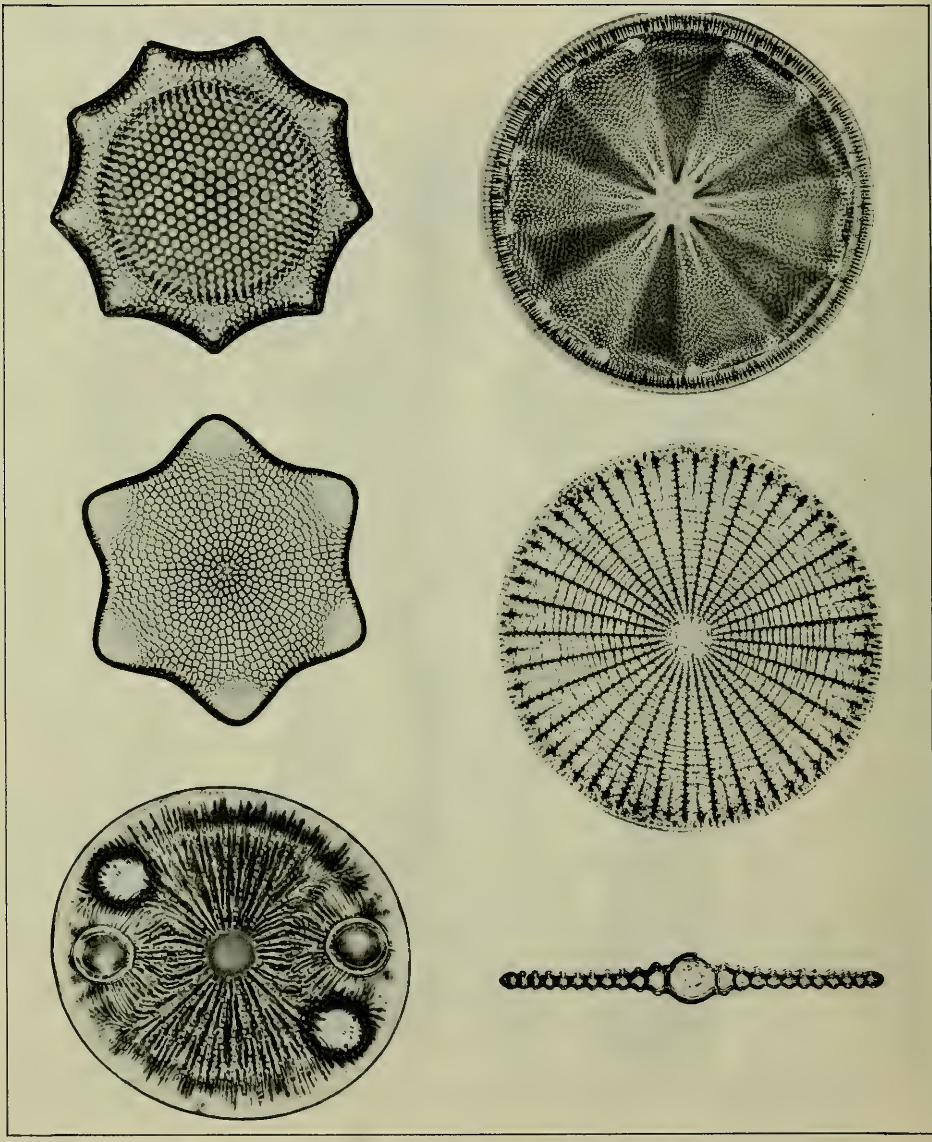


Fig. 3 - Diatoms, drifting plants. (Photo: Dr. Albert Mann)

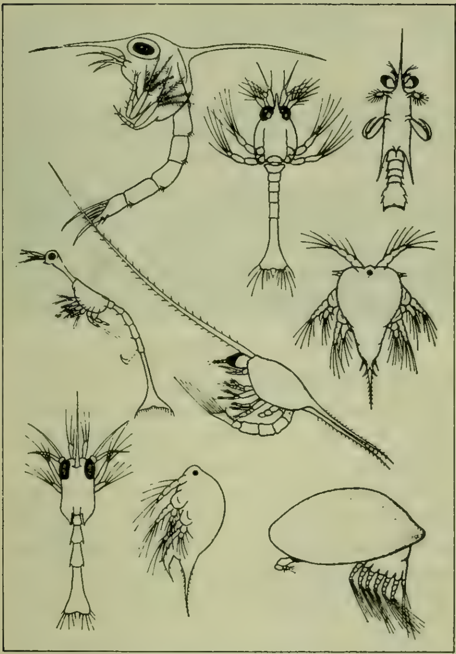


Fig. 4 - Species of crustacean larvae, magnified about 50 diameters, found among planktonic organisms.
(From Johnstone, Scott, Chadwick: Marine Plankton)

Plankton's Nutritive Value

Plankton seems rich in nutrient materials essential for man. Its values are similar to hay's: proteins, 11.5%; carbohydrates, 79.3%; ash, 7%. "Thus, there are no substantial differences between the content of the nutrient substances in marine plankton and in this staple forage food plant from the land."

The high protein content of animal plankton is especially significant because world hunger involves the shortage of calories and, even more critically, the shortage of protein--especially animal protein.

Planktonic creatures have important amounts of other nutrients: crustaceans have Vitamins A and D. Krill have large amounts of Vitamin A, especially in the eyes.

Plankton's Palatability

Regardless of its nutritional value, the UN report continues, "plankton must be palatable to humans if it is to have any significance as a source of food." Limited experience shows that some people will not eat it, while others consider it a fine food.

In 1952, Alain B. Bombard, a French physician, sought to prove that a man could survive a long time on a raft or small boat from nutrients in the sea. Bombard drifted from the Canary Islands to the West Indies and survived 65 days. (A 10-day period is regarded as the limit man can survive such circumstances.) Part of the explanation of his survival was that he ate plankton. It did not rain for 23 days and plankton supplied part of the water he needed. He said it tasted ". . . like lobster, at times like shrimp and at others like some vegetable."

A group that studied plankton's palatability reported it "had a mildly pleasant taste, being somewhat reminiscent of shrimp or oysters." At first, some panel members refused to eat plankton but, after tasting it, "pronounced it either good or not objectionable." The tasters could manage a little less than $\frac{1}{4}$ pound; above that, it became "unacceptable and distasteful." Even a third of $\frac{1}{4}$ pound "gave the impression of remaining undigested in the stomach after several hours."

During the drifting voyage of the "Kon Tiki" from Peru to the Polynesian archipelago in the Pacific, Thor Heyerdahl caught plankton. He later reported: "If it consisted of many dwarf shrimps, it tasted like shrimp paste, lobster, or crab. If it was mostly deepsea fish ova, it tasted like caviar and now and then like oysters. Jellylike coelenterates like glass balloons and jellyfish were bitter and had to be thrown away. Otherwise everything could be eaten, either as it was or cooked in fresh water as gruel or soup. Tastes differ. Two men on board thought plankton tasted delicious, two thought it was quite good, and for two, the sight of them was more than enough. Spiced and properly prepared, plankton can certainly be a first-class dish for all who like marin food."

In Asia, plankton is used more as a food than it is in the western world. In southeastern Asia, fermented fish pastes are made from many kinds of sea animals, including

planktonic crustaceans. Mainland Chinese eat a shrimp paste "as a main accessory food"; the pastes also are eaten by people in India, Japan, and the Philippines. Plankton is established as a food in a large part of the world.

The UN report concludes this section: "Thus, many problems have still to be solved before plankton can be promoted as human food. But while we should not ignore the possible dangers discussed here, and while problems of nutrition are unsettled, especially in relation to the proportion of potential energy absorbed, the animals of the plankton seem to offer great potential as human food in terms of nutritive value and palatability."

Harvesting Plankton

"The story is not so promising from the viewpoints of economic harvesting.... There are immense quantities of plankton in the sea, but in most cases are spread too thinly throughout the vastness of the ocean to allow them to be collected at a reasonable cost at present. But our technology will improve, and new techniques and clever new machines may be developed that will suddenly make an unpromising situation a practical one."

Also needed to establish a plankton fishery is widespread public acceptance. Techniques have to be developed to preserve and package a good-quality product. Today large food companies spend millions of dollars to create markets for new products, which may differ only slightly from old ones. It will take a lot of money to promote a strange food like plankton.

"The best chance of making use of zooplankton is in the manufacture of fodder for domestic animals in the form of dried meal. There may be numerous populations of zooplankton organisms large enough to support properly designed fisheries, once we learn the techniques of harvest and processing." Soviet scientists are actively studying Antarctic krill, and Japanese scientists have done some preliminary work.

The group of zooplanktons believed "most likely to support a commercial fishery" by most experts are the euphausiids, the krill Euphausia superba. It is a relatively large animal--50-60 cm. as an adult. "Of greater importance, it occurs in enormous abundance, and it forms schools at the surface of the sea, where it could be captured by suitable gear."

Soviet scientists have conducted two expeditions to study krill. In the second, in the Antarctic, they used trawls and collected patches of krill in the upper 5 meters of water and pumped them aboard. The krill were scattered down to 100 meters and migrated daily. "Exploitation seems possible on the dense patches close to the surface."

Most of the present thinking about using krill involves making it into meal for supplementary feeding of domestic animals. The Japanese, however, are studying the practicability of using it directly as human food.

The Red Crab

"The red crab, a galatheid crustacean, Pleuroncodes planipes, is another zooplankton resource of possible economic importance." It has a planktonic young stage and, as an adult, an open-sea stage. When young, the red crab is numerous, especially off Baja California, at the southern end of the California Current. It is an area marked by coastal upwelling and such an area typically has high productivity. One oceanographer reported that a ship may crunch through a seemingly solid mass of crabs for mile after mile. "Crabs comprised over 80 percent by volume of all micronekton taken in this rich region."

The red crab is found over and beyond the continental shelf. It has been seen at least 1,000 miles southwest of Baja California, in the California Current's extension. The sea-bottom phase takes place on the continental slope. Studies suggest "that an enormous potential exists for the exploitation of Pleuroncodes. Perhaps the easiest and most productive fisheries would be over the continental shelf, but concentrations offshore may also support catches."

The Squids

"Over 80 percent of the weight of animals of the sea consists of invertebrates. By far the greatest bulk of this material is not used as human food and in all probability never will be. Yet a great deal more than is now being consumed is probably edible."

Squids seem to have the greatest potential for exploitation as a food resource beyond the continental shelves--even greater than open-ocean fishes--because they are "widely distributed, very abundant, palatable and nutritious." Squids are cephalopods, which include octupuses, cuttlefish, argonauts, and others.

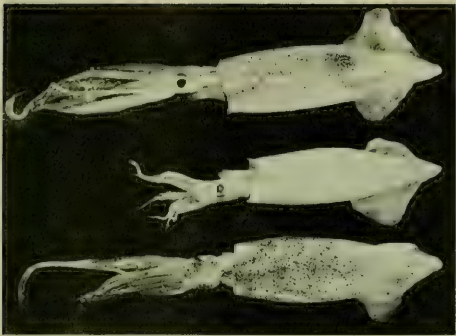


Fig. 5 - Squid. (Photo: V. B. Scheffer)

Squids are highly specialized and have an advanced nervous system. They grow rapidly and some squids reach 55 to 60 feet and 2 tons. Their food varies from plant material to big fishes.

Distribution

Squids are among the most widely distributed marine animals: from the coldest waters of the high latitudes, through temperate zones, and into the tropics. Typically, they occur in the high seas beyond the continental shelf, but many are found over the shelf. Sometimes, high-seas species come into more shallow water.

World Catch

FAO lists 26 nations that land enough squids to be recorded; 11 countries land measurable amounts of cuttlefishes. Only Japan lands large amounts of squids. In the 1960s, Japanese landings ranged from over 306,000 metric tons to 652,000 metric tons. The No. 2 nation, Spain, was far behind. In the early 1960s, Spanish landings ranged from 12,900 to 19,100 metric tons. After Spain come the U. S., Canada, Taiwan, Norway, Italy, and France. The largest production was in 1963: 820,000 metric tons were reported. Today's world production is estimated at 1 million tons.

Squid Fisheries

Squids often travel in schools near the surface and are caught with purse seines and other gear. Jigging, using hooks and lines, is the prevalent method of catching them. Squids appear in large numbers at night near the surface. Today's commercial fisheries are carried out in shallow waters and almost entirely on spawning populations.

Most squids caught by the Japanese are used for food; this is true too for squid fisheries in other parts of Asia and southern Europe. In the second largest fishery, that of Newfoundland, most squids are used as bait for cod.

Although abundant in nearly every ocean, squids are a major fishery only in Japan. Most production comes from Hokkaido, the northernmost island, where it makes up 60 percent of seafood production. The Japanese use hook and line. They shine bright lights overboard, which attract the squids to the boat. They are caught with hooks baited with imitation feathers. The mechanical reel has replaced the hand in pulling lines in rapidly. One fisherman can catch tons of squid in a night.

The main squid fishing season runs from July to December and peaks in October. The principal area is the Tsugaru Straits between Hokkaido and Honshu. During the first 6 months of the year, the squids move south and are not exploited much; most are caught during their breeding migration in northern waters.

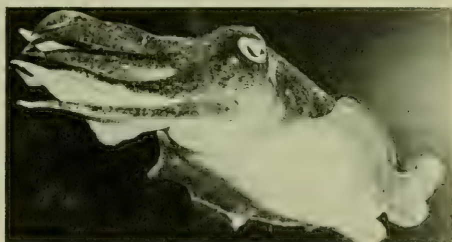


Fig. 6 - Cuttlefish. (Photo: Rex Gary Schmidt)

Most of the catch is eaten in Japan or in Mainland China. About 45% is processed to a dried product; 45% is eaten raw; about 10% is frozen, salted or smoked, or made into paste.

Obstacles to Larger Squid Fisheries

"There are four principal factors which hamper the expansion of squid fisheries: a

strong prejudice against them as human food in most parts of the world; some doubt about their nutritional value; the difficulty of capturing them; the lack of knowledge of their biology, distribution and ecology."

Squid's Virtues

Squid meat is highly nutritious and compares favorably in most respects with fish. In some important respects, it exceeds fish flesh. "It is perfectly suitable for preparation as meal to be fed to domestic animals."

The quality of squid protein is like that of other flesh products, including red meat like beef. Compared to other animals eaten by man, squid has a larger proportion of edible parts to the whole body. With fish, this proportion ranges from 40 to 70 percent; in squid it is 80 percent. Squid meat has as many calories per unit as white fish meat. The digestability of squid meat is about the same as that of many fishes.

The Future

Because squids occur in very large numbers, "they will undoubtedly support large commercial fishery in the next few years." This fishery could even be larger than the present Japanese fishery. Experiments are now underway in Chile to devise methods of catching squids in purse seines. U. S. and Japanese companies are interested in a squid fishery off Peru.

Whales

"Whales represent a large and valuable potential source of food and other useful materials for man, but to realize the potential, more wisdom will have to be displayed in international action than has been evident until now, in order that the depleted stocks can recover under reduced exploitation."

Seals, Sea Lions, Walruses

"The amount of food available from the seals and other marine mammals is not likely to be large.... The seals, sea lions and walruses represent a resource of small size, but one that could be increased moderately by rational management of herds now depleted by over-exploitation."

## Annual Meeting of Inter-American Tropical Tuna Commission

The 1968 annual meeting of the Inter-American Tropical Tuna Commission was held in Panama City, Panama, April 2-4. Representatives were present from Costa Rica, Panama, Mexico, Canada, and the U. S. Ecuador, which gave notice in 1967 of intent to terminate its membership, was not represented. There were observers from Japan, Chile, Nicaragua, UNESCO, and FAO.

For 1969, a yellowfin tuna quota of 93,000 short tons was adopted. The 15-percent incidental catch limit for yellowfin taken incidental to other species during the closed season was continued--but with a new method of application. Before, the laws of each country were applied so that no vessel fishing during the closed season could land more than 15 percent of yellowfin tuna by weight of the total catch during a single trip. At the April meeting, it was agreed that the yellowfin catch during the closed season would not exceed 15 percent of each country's combined total catch of yellowfin and incidental species; also, that each country could allocate the overall limit among its own fishermen as she chose. It was agreed also that a country taking less than 1,000 tons annually would not be bound by the yellowfin quota.

March 1 Opening Proposed

The Commission proposed March 1, 1969, as the date for opening the 1969 season. It requested member nations to vote by correspondence before Sept. 1, 1968. If the vote does not favor unanimously March 1, 1969, then the 1969 season will begin January 1.

U. S. Changes Necessary

It will be necessary for the U. S. to change her present yellowfin tuna regulations to comply with Commission recommendations. A notice of proposed rule making was published in the "Federal Register," April 16, 1968. A public hearing on the proposed rules was scheduled for April 29 in San Diego, Calif.

## Poland and Ireland Sign Fishery Trade Agreement

A trade arrangement between the Irish Sea Fisheries Board and 2 Polish State companies, Centromor and Rybex, was concluded in Warsaw in late March 1968. Centromor is the central import and export board for ships and marine equipment. Under the agreement with Centromor, credit facilities will be provided to finance the purchase of Polish-built, steel-hulled trawlers by Irish skippers and fishing companies. Provision also was made for educational and technical assistance to the Irish fishing industry, if required.

Benefits for Both

In consideration of orders placed in Poland for fishing vessels, Centromor will take into account the capacity of Irish shipyards to construct vessels to Centromor's requirements when it is negotiating orders. Further, Irish shipyards will be given a chance to quote prices for enquiries received by Centromor from foreign countries, whenever Poland cannot build such ships.

Concurrent with the financial agreement with Centromor, negotiations also took place with Rybex regarding markets for Irish fishery products in Poland. Rybex is the Polish fish import/export State company. These discussions resulted in a substantial order for Irish herring to be completed during the 1968/69 herring season.

Irish Fleet Strengthened

Irish fishermen were investing in powerful modern trawlers. This year they will see a record number of new vessels being commissioned for their fishing fleet. Poland is one of the most advanced fishing nations in Europe. Its shipbuilding yards rank among the Continent's most modern. The quality of their vessels, plus the attractive loan facilities offered, should provide a great stimulus for the expansion of the Irish fishing industry. (Irish Sea Fisheries Board, March 30, 1968.)

## Norway and Indonesia Agree on Joint Venture

A/S Nor Kar of Norway and C. V. Bonito of Indonesia have agreed on a joint fishing venture in Indonesia. The agreement calls for a one-year survey and extends for 15 years.

The fishing grounds covered by the agreement are off the north coast of Sulawesi (Celebes). The operation will be conducted on a pooled-catch basis and will require an investment of US$1 million. The catch will be marketed in Indonesia and abroad.

Local Fishermen Protested

Fishing would be at least 15 miles offshore--and thus would have no adverse effect on local fishermen. Presumably, this is an attempt by the Indonesian Government to dispel such fears in advance.

A survey by a South Korean fishing fleet off Java's south coast, in accordance with a contract signed Sept. 18, 1967, was met by strong complaints from the local netters. They claimed the Korean operation reduced their shrimp catch 70 percent. (U. S. Embassy, Djakarta, Mar. 25, 1968.)

## Chile and Peru Differ on Japanese Survey

The Japanese Fisheries Agency plans to explore off the west coast of South America in fall 1968. It will use the 3,200-gross-ton Government research vessel "Kaiyo Maru" to assess the effect of the Humbolt Current on fishery resources.

In late January 1968, a Japanese mission was sent to the South American countries bordering the Pacific to sound out their feelings. The mission found Chile very enthusiastic. Chile promised to make her research data available and requested the Japanese to conduct cookery courses aboard the vessel to promote fish in Chile.

Peru Cold To Survey

In contrast, Peru was cold both toward the survey and the earlier Japanese industry offer to explore Peru's commercial fishery potential.

The mission noted Peru becoming increasingly cautious over these and similar proposals reportedly advanced by the U. S. However, Peru was inclined to go along with the "Kaiyo Maru" survey--provided it was purely scientific. ("Nihon Suisan Shimbun," Feb. 26, 1968.)

## North Pacific Fur Seal Commission Meets in Moscow

On April 12, 1968, representatives from Canada, Japan, the USSR, and the U. S. concluded the Eleventh Meeting of the North Pacific Fur Seal Commission. The Commission was established by the Interim Convention on Conservation of North Pacific Fur Seals ratified in 1957.

At the opening meeting on April 8, M. H. Sukhoruchenko, Deputy Minister, Ministry of Fisheries of the USSR, said:

"The work of the Commission in preserving the fur seal resources and in carrying out the rational killing of fur seals is of great importance. The fruitful cooperation of scientists and specialists of Canada, Japan, the United States and the Soviet Union, who assist the Fur Seal Commission, contributes greatly to scientifically based recommendations which lead to practical steps for the rational use of living marine resources. During the whole period of the Convention, the Commission's work to preserve fur seals has set a good example for the successful resolution of complicated problems of international hunting regulations."

Seeks Maximum Sustainable Yield

The Commission's research is directed toward achieving the maximum sustainable yield from the fur seal resource. Due regard is shown to the effect on other living marine resources--and toward studies of sealskin quality and the effectiveness of sealing methods.

During 1967, 17,505 skins of fur seals were taken by the Soviet Union on the breeding islands, and 65,816 skins were similarly taken by the U. S. Canada and Japan each received 15 percent from both, as provided by the Convention.

Scientific Committee Meets

The Commission meeting was preceded by a meeting of the Commission's Standing Scientific Committee, which began March 25.

The Committee completed work on a comprehensive summary of 1964-66 investigations. This will be published in the Commission's 3 official languages. The information in this and earlier reports will be considered by the Governments when the Convention's future is considered after October 1968.

An interesting development in recent years has been the reestablishment and growth of rookeries in the Kuril Islands, where seals had been exterminated during the 19th century.

The Commission reviewed evidence on whether pelagic sealing could be permitted along with land sealing under certain circumstances, without adversely affecting Convention objectives. The Commission decided that the information was not yet sufficient for a final decision. It will recommend that appropriate research be continued.

Exchange of Scientists

Under the Commission's scientist exchange program, Dr. Tadayoshi Ichihara, Japanese Far Seas Fishery Research Laboratory, visited the Pribilof Islands in 1967 to observe sealing activities and the preliminary processing of sealskins. Hiroshi Kajimura, U.S. Marine Mammal Biological Laboratory, visited Japan in 1967 to observe pelagic sealing for research purposes off the coast.

In 1968, a Japanese scientist will be aboard a U. S. research vessel in the eastern Pacific Ocean. Also, the U. S. plans to send 2 fur seal biologists, an ornithologist, and an interpreter to the Commander Islands.

New Officers Elected

The Governments rotate Commission offices. Commissioner Miyoshi of Japan was elected next Chairman, and Commissioner Fedorov of the USSR Vice-Chairman.

The next meeting will be held in Tokyo, starting Feb. 24, 1969. It will be preceded by a meeting of the Standing Scientific Committee beginning Feb. 17. (Joint Press Release, Moscow, April 12, 1968.)

## Tuna Fleets of Taiwan, Japan, and South Korea

A Japanese survey shows 935 Taiwanese, Japanese, and South Korean tuna vessels fishing in the Pacific, Indian, and Atlantic Oceans. Japan has 555, Formosa (Taiwan) 226, and South Korea 154.

Taiwan plans to add 69 tuna vessels to her fleet in 1968. South Korea is building 38 new tuna vessels for operation this year.

| Area of Operation | Japan1/ | Taiwan1/ | South Korea2/ |
|---|---|---|---|
| | . . . . . | (No. of Vessels) . . . . . | |
| East. Pacific Ocean . . . . . | 200 | 0 | 0 |
| So. Pacific Ocean: | | | |
| American Samoa. . . . . . | 30 | 86 | 67 |
| Espiritu Santo & Fiji Is. . . | 0 | 15 | 13 |
| Homeland-based operations | 50 | 0 | 0 |
| Tasman Sea (off Australia) . | 100 | 0 | 0 |
| Indian Ocean . . . . . . . . | 130 | 100 | 17 |
| Atlantic Ocean . . . . . . . | 45 | 25 | 19 |
| Vessels in home ports . . . . | 0 | 0 | 38 |
| Total. . . . . . . . . . . | 555 | 226 | 154 |

1/As of Feb. 10, 1968.
2/As of March 8, 1968.

Japanese To Transfer Vessels

The Japanese fleet is not likely to increase beyond the present level. Japanese fishing firms are planning to transfer vessels from American Samoa and other areas to the Tasman Sea off southeast Australia, and to the Indian Ocean. From latter, catches are being shipped back to Japan because of good prices. ("Suisancho Nippo," Mar. 11, 1968.)

## France and USSR Cooperate in Fishery Matters

The Joint Franco-Soviet Commission on Economic Cooperation, which meets permanently in Moscow, has established a "Working Group on Problems in Cooperation in Food Industries and Equipment." The Soviets are interested in: techniques of overhauling and repairing fishing vessels; canning of fishery products (especially in small cans); processing of algae, mollusks, and shrimp; and plastic packaging of fishery products.

The French are proposing to deliver fishing vessels, completed canneries, fish-meal plants, packaging materials--and to sell salted cod and canned tuna.

It appears that the two countries are preparing to exchange fishery delegations. Several French industry representatives will travel for two weeks to Kaliningrad and Murmansk to study Soviet pelagic (midwater) trawling. They will visit processing "kombines" in two fishing centers. ("France Peche," Jan. 1968.)

Both Seek More Trade Contacts

It appears that the Soviets and French are mostly interested in increasing fishery trade contacts and less in fisheries cooperation as such. They do not compete in any significant world fishery. A 1965 Soviet order for 3 fishing and canning stern trawlers--world's largest, each over 6,000 gross tons--made it evident to French industry and Government that there is a huge potential market for French products in the Soviet fishing industry.

This Soviet need was filled by other West European countries (Sweden, Denmark, West Germany) until the USSR placed the US$1 million order for the 3 vessels with the Nantes Shipyards.

## Soviet Research Vessel Visits India and Burma

In late January 1968, the modern, well-equipped Soviet research vessel "Nauka" departed for the Indian Ocean. She was scheduled to stop in Indian and Burmese ports, where Soviet scientists were to meet with their local counterparts.

The cruise's primary mission is to explore new fishing grounds; the secondary one is to test new oceanographic instruments. Also, the vessel will attempt to fish at 1,500 fathoms; if successful, it will be the first time the Soviets have fished that deep with commercial gear.

1963 Expedition

During the 1963 International Indian Ocean Expedition, the U. S. research vessel "Anton Bruun" trawled for shrimp deeper than 1,000 fathoms. (Vessels of BCF's Seattle Exploratory Gear Base also trawled as deep as 1,050 fathoms recently.)

The Soviet fishery administrators first visited Burma in 1964. N. S. Goriunov, head of the Directorate for the Exploitation of Fishing Fleets and Port Administration of the Soviet Ministry of Fisheries, led the 1964 delegation, which visited processing plants and the port of Mergui (on Andaman Sea) "to study deep-sea fisheries."

1966 Burma Visit

In Feb. 1966, the Soviet research vessel "Adademik Knipovich" stopped at Rangoon. Four Burmese fishery scientists were invited to participate in a 10-day cruise and joint study of fishery resources off Burma's coast. The Soviet scientific party was headed by Dr. A. S. Bogdanov, Director of the Soviet Federal Institute for Fisheries and Oceanography in Moscow.

## World Fishery Trade Rose Again in 1966

In 1966, world trade (excluding Mainland China) in fish and fish products reached a record US$2,400 million. This was $220 million above 1965 and $420 million above 1964.

The figures were published February 1968 in the FAO "Yearbook on Fishery Statistics." They were based on trade statistics furnished by 151 countries accounting for almost 90 percent of the 1966 world fish catch of 57 million metric tons. Mainland China, for which no figures were available, would make up most of the remainder.

Japan No. 1 Earner

Peru exported the greatest quantity of fish products--1,419,200 metric tons, almost all fish meal--but was third in export earnings. Japan was the biggest export earner, followed by Norway. The biggest importer was the U. S., followed by the United Kingdom. (FAO "News Roundup," Jan.-Feb. 1968.)

## Fish Oil Prices Decline

The European price for herring oil has dropped. In March 1968, the price of Danish herring oil was down to US$93 a metric ton. Last spring, it was $115 a ton; during 1967, it reached a high of $182.

Unrefined Peruvian anchovy oil was on its way to Europe. The oil was sold at about $79 a ton; half-refined Peruvian oil sells for $91 a ton.

Half Icelandic Oil Unsold

Iceland had about one-half last year's herring oil unsold. Some of it was owned by the State herring plants. The mean price State plants received was about $115 a ton. It is believed privately owned plants sold at a slightly lower price. At present, therefore, price prospects for herring oil are poor.


## FAO Conference on Fishing Ports & Port Markets: Bremen, September

An FAO-sponsored International Conference on Fishing Ports and Port Markets will be held at Bremen, W. Germany, Sept. 23-28, 1968. It is open to all member nations and associated members. It will be conducted in English, French, Spanish, and German.

During the past few years, FAO's Department of Fisheries has received many requests for information, advice, and technical assistance in developing fishing harbors and port markets. Most important in building a healthy fishing industry are suitable harbors or landing facilities and the development of efficient primary marketing channels. Many questions on the financial and administrative aspects of harbor development also were asked.

FAO Report Has Many Answers

To disseminate the available information, FAO's Department of Fisheries has published "Landing and Marketing Facilities at Selected Sea Fishing Ports." This report will be used as a basic working document at the conference.

A provisional agenda for the conference lists for discussion: the role of harbors in development; feasibility studies and planning; civil engineering in fishery harbors; fishing port installations and services; and the administration and financing of fishery harbors.

## FAO-UNESCO Symposium on Caribbean Sea

An FAO-UNESCO Symposium on Investigations and Resources of the Caribbean Sea and Adjacent Regions will be held in Willemstad, Curacao, Netherlands Antilles, Nov. 18-26, 1968. It will review knowledge and identify gaps in scientific investigations and resources research. Its purpose is to improve scientific cooperation and rational use of marine resources in the Caribbean Sea, the Gulf of Mexico, and adjacent Atlantic Ocean.

Another purpose is to facilitate planning of the Cooperative Investigations of the Caribbean and Adjacent Regions (CICAR) to be initiated in 1970 under the Intergovernmental Oceanographic Commission (IOC).

Agenda

The Symposium will be divided into these sections: (1) physics and chemistry of the area, and ocean-atmosphere interaction, including hurricanes; (2) geology, geophysics, and mineral resources; (3) marine biology; and (4) fishery resources.

Additional information and application forms can be obtained from Dr. N. K. Federov, Director, Office of Oceanography, UNESCO, Place de Fontenoy, Paris 7, France.

Abstracts of papers should be submitted by July 1. Abstracts under sections (1) and (2) should be submitted to Dr. Federov. For (3) and (4), send to Dr. M. Ruivo, Chief, Marine Biology and Environment Branch, Department of Fisheries, FAO, Via delle Terme di Caracalla, Rome, Italy. Languages are English and Spanish.) (UNESCO, Jan. 30, 1968.)

## Symposium Held on Suppressing Odors in Fishery Byproducts

The subject of odor suppression in the processing of animal byproducts was discussed at a symposium in England on March 14, 1968. It is believed the first ever devoted entirely to this subject. Speakers described experiments demonstrating that a substantial reduction in the odor-producing material escaping from a plant does not give a corresponding reduction in odor intensity. The most effective method of odor reduction is thought to be confinement and recirculation of the odor-carrying vapors--rather than treatment to remove smells or attempts to mask unpleasant odors.

Drying Plant

A drying plant was described in which the drying air was continuously recirculated and retained within the plant. Both the output and quality of fish meal produced were equal to those achieved with conventional equipment. Moreover, no vapors were discharged into the atmosphere. Also achieved were a reduction in the amount of water needed for cooling and in the quantity of polluted water produced.

Other Symposium Subjects

Other discussions concerned the importance of good housekeeping in processing plants, the difficulty of applying a recirculation system to batch production, and the ability of malodorous vapors to carry over long distances with little reduction in intensity. (Ministry of Technology, United Kingdom, Mar. 15, 1968.)

## 1967/68 Antarctic Whale Catch Reported

The Whaling Commission reports the total baleen whale catch during the 1967/68 Antarctic season, by fleet, as:

| | Blue-Whale Units |
|---|---|
| Norway: | |
| "Kosmos IV" | 292 |
| Japan: | |
| "Tonan Maru No. 2" | 425 |
| "Nisshin Maru" | 413 |
| "Nisshin Maru No. 3" | 230 |
| "Kyokuyo Maru No. 3" | 425 |
| Total | 1,493 |
| USSR: | |
| "Juri Dolgorukij" | 288 |
| "Sovietskaya Rossia" | 368 |
| "Sovietskaya Ukraina" | 360 |
| Total | 1,016 |
| Grand Total | 2,801 |

## International Whaling Commission Calls 2 Meetings

A working session of the International Whaling Commission (IWC) Scientific Committee will meet in Tokyo, June 13-15, prior to 20th Annual Meeting of the Commission. Stock assessments for the Antarctic--and possibly new assessments for North Pacific baleen stocks and sperm stocks in general--will be reviewed.

Commission Agenda

The Commission will meet June 24-28. It has a lengthy agenda, including the International Observer Scheme, Special Scientific Investigation of the Whale Stocks, and Economic Studies of Whaling Regulations. (International Whaling Commission, Apr. 10, 1968.)

## Southeast Asia Fisheries Center Council Meets

The Southeast Asia Fisheries Development Center held its first council meeting in Bangkok, Thailand, March 19-21, 1968. Represented were Japan, Singapore, Malaysia, Thailand, and South Vietnam. Also present were a U. S. Embassy official and the FAO fishery specialist in Thailand. The programs for fishermen's training at Bangkok and research at Singapore were adopted; administrators were appointed.

Thai Training Center

For the Thailand Training Center, scheduled to open April 1969, the Director of the Thailand Fisheries Bureau was appointed director, and the Director of the Nansei (Southwest Japan) Regional Fisheries Laboratory deputy director. The Singapore Research Center, scheduled to open in early 1969, will be headed by the Director of the Singapore Fisheries Bureau; the Director of the Nagasaki Fisheries Experimental Station will serve as deputy director.

Japan's Contributions

To operate the Development Center, Japan will contribute one 350-gross-ton fishing vessel, equipment for land and sea facilities, and fishery specialists. She will provide scholarships for trainees sent to Japan from the Center. Other member nations will be assessed US$2,000 a year to finance the projects. ("Suisancho Nippo," Mar. 27, 1968.)

## Dutch Hydrographer Warns of Polluted Seas

Oceanic research and exploration require urgent international cooperation to better use and conserve marine resources, a noted hydrographer told FAO in Rome on April 24.

Rear-Adm. W. Langeraar, hydrographer of the Royal Netherlands Navy and Chairman of the Intergovernmental Oceanographic Commission (IOC), spoke at the opening of the Third Session of the FAO Committee on Fisheries. The 34-nation Committee met until April 30 to discuss urgent world fishery problems and relevant FAO action.

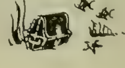
Oceans Belong to Mankind

Admiral Langeraar emphasized that the oceans and their resources are "the common interest of all mankind" and so require coordinated action--so that future generations "will not stand at the shores of empty seas, polluted beyond recovery." He called for new concepts of law, peaceful cooperation, and mutual assistance to promote the seas' uses for the benefit of all mankind.

Admiral Langeraar stated that "the great drive towards the oceans" began only 11 years ago with the International Geophysical Year. As a result, international cooperation was scattered. He urged "unrestricted cooperation" between governments and international agencies in oceanic exploration and management.

Greater FAO Effort

Addeke H. Boerma, Director-General of FAO, said that "international collaboration must be perfected to ensure proper exploitation" of the sea's resources. Also, there is need for funds and efforts on an entirely new scale if maximum benefits are to be derived from the world's oceans and inland waters. He cited FAO's own role in promoting fisheries action. He noted the plans to expand FAO's Department of Fisheries to enable it to participate more fully in international efforts.



## Atlantic Tuna May Come Under International Protection

The tuna of the north and south Atlantic may soon come under international protection, reports FAO. A pact safeguarding tuna stocks in the 2 oceans "seems assured of early enactment."

In April, France, Spain, and Canada told an FAO meeting in Rome that they were moving toward adherence to the International Convention for the Conservation of Atlantic Tunas. The Convention was drafted in May 1966 in Rio de Janeiro under FAO auspices. It will establish a commission to protect Atlantic tunas from overfishing.

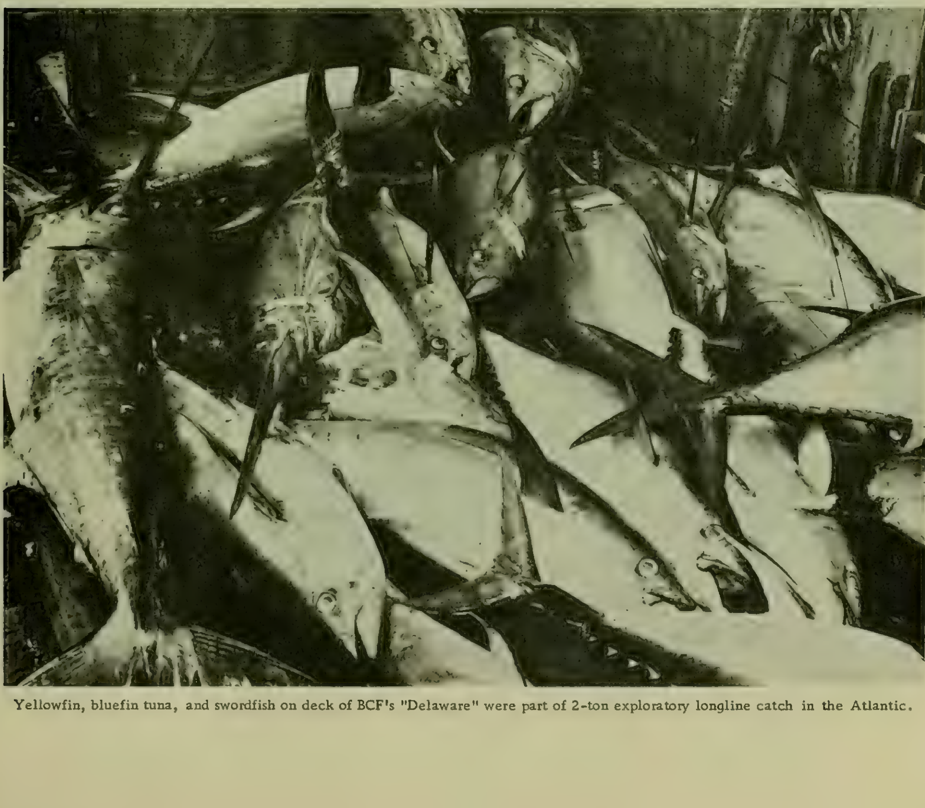
4 Signatories Already

Four nations--the U.S., Japan, South Africa, and Ghana--already have ratified it. Three more are needed for the required minimum of 7.

The new ratifications were pledged before FAO's Committee on Fisheries, a 34-nation group that met in Rome through April 30.

The group was told that yellowfin tuna stocks in the tropical Atlantic and bluefins in the north Atlantic "are being severely affected by fishing." Also, yellowfins in the Indian Ocean and possibly in the western Pacific need management.

An FAO document said that Japan, the world's No. 2 fishing nation, was taking fewer tunas than before. But there is increased fishing by other nations, including France, Korea, and the U. S. The document cited greater mobility of fishing vessels as a factor, especially off northwest Africa.



Yellowfin, bluefin tuna, and swordfish on deck of BCF's "Delaware" were part of 2-ton exploratory longline catch in the Atlantic.

Canadian lobster fisherman throws overside 25-lb. plastic trap called "igloo."

# FOREIGN

## CANADA

### LANDINGS AND VALUE FELL IN 1967

In 1967, Canadian sea fisheries landings (including those of Newfoundland) were about 2.4 billion pounds with an exvessel value of C$144.4 million; in 1966, they were 2.5 billion pounds valued at $159 million. These figures exclude seaweeds. ("Monthly Review of Canadian Fisheries Statistics," Dec. 1967.)

Landings and exvessel values of the principal species were:

| | Landings | | Value | |
|---|---|---|---|---|
| | 1967 | 1966 | 1967 | 1966 |
| | . . (1,000 Lbs.) . . | | . . (C$1,000) . . | |
| Atlantic Coast: | | | | |
| Cod . . . . . . . | 521,369 | 563,078 | 23,081 | 25,092 |
| Haddock . . . . . | 102,928 | 112,819 | 6,814 | 8,037 |
| Pollock . . . . . | 32,737 | 34,577 | 1,290 | 1,380 |
| Flounder & sole . | 227,326 | 232,954 | 7,560 | 7,764 |
| Herring . . . . . | 763,725 | 569,891 | 8,222 | 6,220 |
| Ocean perch . . | 173,940 | 183,079 | 4,498 | 5,082 |
| Swordfish . . . . | 8,076 | 7,403 | 3,322 | 3,214 |
| Lobsters . . . . | 35,065 | 37,338 | 23,304 | 22,036 |
| Scallops . . . . | 13,340 | 18,250 | 7,770 | 7,448 |
| Pacific Coast: | | | | |
| Halibut . . . . . | 25,125 | 32,000 | 6,353 | 11,471 |
| Herring . . . . . | 110,816 | 307,653 | 1,847 | 5,107 |
| Salmon . . . . . | 129,979 | 162,863 | 34,988 | 38,654 |
| Cod . . . . . . . | 10,612 | 20,706 | 737 | 1,436 |

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### BRITISH COLUMBIA HERRING LANDINGS AND PRODUCTS FALL SHARPLY

On March 20, the Canadian Department of Fisheries, Vancouver, reported the following data on British Columbia herring landings and products produced:

| | Unit | Season Ending | | | | | |
|---|---|---|---|---|---|---|---|
| | Tons | 3/16/68 | 3/4/67 | 3/26/66 | 3/27/65 | 3/28/64 | 3/10/63 |
| Landings: | | | | | | | |
| Queen Charlotte Islands . . . . | " | - | 597 | 6,628 | 46,985 | 32,582 | 19,856 |
| Northern . . . . . . . . . . . . | " | 5,307 | 13,671 | 25,415 | 46,632 | 35,016 | 42,792 |
| Central . . . . . . . . . . . . | " | 4,339 | 33,813 | 57,856 | 22,107 | 56,123 | 62,626 |
| Upper East Coast . . . . . . . . | " | 5,556 | 15,769 | 18,807 | 18,672 | 15,513 | 10,697 |
| Middle East Coast . . . . . . . | " | 736 | 11,750 | 20,668 | 23,845 | 20,347 | 24,707 |
| Lower East Coast . . . . . . . . | " | 1,178 | 25,459 | 18,144 | 37,849 | 66,216 | 55,665 |
| West Coast Van. Island . . . . | " | 1,699 | 32,764 | 32,847 | 44,490 | 36,248 | 49,304 |
| B.C. total landings . . . . . | " | 18,815 | 133,823 | 180,365 | 240,580 | 262,045 | 265,647 |
| Products Produced: | | | | | | | |
| Meal . . . . . . . . . . . . . . | " | 3,077 | 23,356 | 32,163 | 43,062 | 46,778 | 48,035 |
| Oil (Imp. Gals.) . . . . . . . . | | 427,768 | 2,776,610 | 3,855,322 | 5,436,358 | 4,877,688 | 4,771,087 |

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### QUEBEC FISHERMEN BROKE ALL CATCH RECORDS IN 1967

Quebec fishermen broke all catch records in 1967 by landing 190 million pounds of fish worth C$7.3 million. This was reported by the Quebec Ministry of Industry and Commerce in the Dec. 1967 issue of "Maritime Fisheries." In 1966, the catch was 144.5 million pounds worth $6.7 million.

#### Catch, Not Fishermen, Increased

The 1967 catch was especially outstanding because there was no increase in number of fishermen. The Quebec Government contributed to the increased production by helping to buy larger fishing vessels. During the six months of 1967 when fishing traditionally is slowest, 41 million pounds were landed, double the 1966 period's.

The Government looks forward to even greater catches as fishermen become more experienced with the new equipment. (U. S. Consul, Quebec, Feb. 26, 1968.)

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### CONFERENCE ON FISHING VESSEL CONSTRUCTION MATERIALS SCHEDULED

A conference to include fishing interests, manufacturers and suppliers of construction materials for vessels is slated for the Queen Elizabeth Hotel in Montreal, Canada, Oct. 1-3, 1968. It will be sponsored by the Canadian Federal-Provincial Atlantic Fisheries Committee (CF-PAFC).

Canada (Contd.):

The participants will consider traditional and newer materials used, or may be used, in hulls, decks, and superstructures of fishing vessels. These include wood, steel, plastic, aluminum, and concrete. Boatbuilders, vessel owners and operators, naval architects, manufacturers, fabricators, government specialists, and others will examine the advantages of the various products. They will discuss raw materials and their application to design, construction, quality control, vessel operation and maintenance, and their comparative costs.

International Conference

Like previous CF-PAFC conferences, this one will have an international flavor. Interest already has been shown by foreign fishing, shipbuilding, and manufacturing interests and across Canada. World experts will be among the 30 specialists to present papers. About 400 people are expected to attend. (Canadian Department of Fisheries, Jan. 15, 1968.)

* * *

REVIEW OF FISHERY SUBSIDIES

Canada's fishing industry is subsidized. A significant part of subsidies is the responsibility of the Provincial Governments. Under a recently amended law, Canada's Fisheries Department provides: 30 percent of cost for wooden fishing vessels over 45 feet and under 100 GRT; 40 percent of cost for wooden vessels over 100 GRT.

This subsidy has been in operation since 1947. Its cost in FY 1966/67 was C$2.1 million. It also is paid on construction costs for vessels over 75 feet on non-wood hulls. The amount was reduced from 50 percent to 35 percent of costs in December 1967. Total expenditures since 1961 equal C$72.3 million. Estimated costs in 1967/68 are C$20 million. The Fisheries Department has no other fishery subsidy program--except those for normal research and development.

Nova Scotia

There is no construction subsidy for fishing boats. However, Province does provide low-interest loans for boat construction purposes; rate is one-half percent above cost to Nova Scotian Government

British Columbia: No fishing subsidy programs.

Quebec

Makes grants to fishermen; pays subsidies on construction of small fishing boats and replacement of motors; pays complete federal insurance premium on small fishing boats; and partially subsidizes premiums for large fishing boats. Provincial Government presently is paying catch subsidies on ocean perch (max. $\frac{3}{4}$¢ a lb.), plaice (max. $\frac{1}{2}$¢ a lb.), and cod (max. $1\frac{1}{4}$¢ a lb.). Subsidies diminish as market improves.

Newfoundland

Under Inshore Fisheries Assistance Program, pays grants or "bounty" of various amounts to fishermen on newly constructed fishing vessels from 24 feet to 35 feet. Approved fishing boats over 36 feet (10 tons) are covered by a Provincial subsidy of C$160 a ton (Fishing Ships [Bounties] Act, 1955). A grant also is given to fishermen on certain types of nylon and other synthetic fiber gill nets, on nylon lines and long lines. Additional grants are paid under The Coasting Vessels [Bounties] Act, 1959, but these most often apply to freight vessels.

Other Aid

Low-interest loans are also available to fishermen through the Fisheries Loan Board, primarily to develop and improve inshore fishery. Also available is the Fishing and Coasting Vessels Rebuilding and Repairs [Bounties] Act, 1958. The Inshore Fisheries Assistance program is the largest in terms of dollars. It amounted to close to C$390,000 in fiscal 1967-68 (April 1-March 31). The Fishing Ships [Bounties] Act is the next largest: about C$240,000. Subsidy amounts under the other programs are much smaller.

New Brunswick

Pays a subsidy for vessel construction. The Federal Government pays its share (now 35 percent) directly to the shipyard; fishermen pay 10 to 15 percent, depending on size of vessel; the Province pays the rest. Fishermen repay the Province with interest at 4 percent on the balance outstanding. The effect of the reduction in Federal share of the subsidy from 50 to 35 percent is causing Provincial Government to study costs of construction of steel-hulled trawlers in Europe, especially in United Kingdom and France. New Brunswick has budgeted C$3.6 million for its boat-building program in 1968.

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Canada (Contd.):

## NEW BRUNSWICK BEGINS FISH INSPECTION

The new Fish Inspection Act of New Brunswick is being carried out, announced Provincial Fisheries Minister Ernest Richard on March 26, 1968. The work is being done by a fish inspection and marketing branch within his department. The new branch has 2 purposes: to protect consumers and to promote fish products. From now on all fish plants, fish buyers, and fish peddlers in New Brunswick will have to be licensed. Although retailers will not require a license, their products offered for sale would be inspected on the premises to insure freshness.

### Assesses European Market

The Provincial Government has assessed European market possibilities for New Brunswick fish products. Reportedly, it found great interest in queen crab, shrimp, salmon, lobster, canned cod livers, cod roe, skate wings and dogfish, and frozen eel. In Germany and Holland, there is demand for frozen herring.

Successful crab and shrimp exploratory projects were carried out by New Brunswick last year; 366,000 pounds of crab were caught and yielded 70,000 pounds of meat. A second processing plant was opened at Shippegan for this purpose; a third is planned in 1968. The market for New Brunswick shrimp was good, especially in Scandinavia and Great Britain. Demand actually exceeded present supply. Shrimp boats will test new gear and be equipped with refrigerated systems.

### Fisheries Department Programs

West Coast fishermen joined the herring fleet in New Brunswick--spurring worldwide interest in the fishery. The Fisheries Department expanded a training program with local fishermen at the Caraquet school, supplemented by time on board Pacific coast vessels. It expanded technical and financial assistance. And it experimented with the Scottish drift-netting system.

The New Brunswick Fisheries Department had arranged to build 3 steel trawler-seiners at the Saint John Shipbuilding and Dry Dock Co., Ltd., before the recent reduction in federal subsidy from 50 to 35 percent. The Provincial Government has made strong representations to the Federal Government for retention of the 50-percent subsidy on large fishing vessels. Each trawler-seiner will cost C$1,200,000.

Costs of vessels in foreign shipyards have been investigated. This despite policies of the department and the Fishermen's Loan Board to have boats built in New Brunswick--and even to allow a 10-percent favorable differential in cost to local yards. (U. S. Consul, St. John, N. B., Apr. 8, 1968.)

* * *

## CANADIAN PRODUCTION OF FISHERY PRODUCTS IN 1967 AND 1966

| | 1967 | 1966 |
|---|---|---|
| | . . . (1,000 Lbs.) . . . | |
| Atlantic Coast: | | |
| Frozen whole & dressed fish | 11,124 | 12,634 |
| Frozen fillets | 124,720 | 137,071 |
| Blocks & slabs | 93,805 | 106,213 |
| Fish sticks | 1/ | 4,807 |
| Portions | 2,941 | 3,059 |
| Shellfish, frozen | 11,839 | 1/ |
| Shellfish, fresh | 1/ | 446 |
| Frozen-smoked, dressed or fillets | 6,033 | 6,202 |
| Salted and smoked | 538,604 | 584,335 |
| Wet salted | 131,911 | 109,994 |
| | . . . . (Barrels) . . . . | |
| Pickled & cured | 120,687 | 115,556 |
| | . . . (1,000 Cases) . . . | |
| Canned fish & shellfish | 1,146 | 1,471 |
| | . . . (Short Tons) . . . | |
| Fish Meal | 88,549 | 68,978 |
| | . . (Imperial Gals.) . . | |
| Oil | 6,089 | 3,230 |
| Pacific Coast: | . . . (1,000 Lbs.) . . . | |
| Frozen whole & dressed fish2/ | 2,333 | 2,391 |
| Frozen salmon (whole & dressed) | 19,822 | 20,318 |
| Other frozen whole & dressed fish | 15,764 | 15,768 |
| Frozen fillets | 4,777 | 6,450 |
| Frozen smoked | 808 | 905 |
| | . . . (1,000 Cases) . . . | |
| Canned salmon | 1,466 | 1,817 |
| | . . . (Short Tons) . . . | |
| Herring meal | 9,678 | 27,181 |
| | . . (Imperial Gals.) . . | |
| Herring oil | 837,900 | 3,081,022 |

1/Confidential--included with "other."
2/Cod and herring only.
(Source: "Monthly Review of Canadian Fisheries Statistics.")

# EUROPE

## USSR

ENTERS WORLD FISH MEAL MARKETS

The Fishmeal Exporters Organization reports that during 1967 the Soviet Union exported to West Germany 15,541 metric tons of fish meal. In 1966, such exports amounted to only 2,062 tons.

In January 1968, the Soviet Union exported 3,500 metric tons of fish meal to West Germany, compared with Jan. 1967 exports of 700 tons. This development is surprising because the Soviets have repeatedly stated that their supply is far below present and especially future domestic fish meal demand. By 1970, the demand should approach 1 million metric tons. In 1966, the total Soviet domestic production of fish and whale meals was barely 30 percent of that figure.

* * *

FAO SEMINAR ON FISH CULTURE

A seminar and study tour devoted to fish culture was scheduled to be held in the Soviet Union from April 12 to May 25, 1968. The seminar was intended for fishery scientists from developing nations that already have a program for genetic selection or hybridization of fish--or have facilities and personnel to undertake such work (FAO News Roundup).

This was the 11th FAO-sponsored seminar in the Soviet Union. Most lectures and tours were to be held in Kiev and Leningrad. Costs were covered by Soviet rubles available to FAO, except for travel arrangements.

* * *

TO STUDY NORTH ATLANTIC CURRENTS

Admiral B. Filippov, Director of the Leningrad Institute of Oceanography, has disclosed that his oceanographers will make extensive investigations of ocean currents in the North Atlantic this summer. It will be the fifth in a series of similar cruises.

Among other things, the oceanographers will explore the characteristics of currents south of Iceland. It is expected that the data collected will make it possible to explain the instability of the North Atlantic currents, thought to have some connection with atmospheric conditions. It is hoped the research will aid fishery forecasting. ("Politiken," Copenhagen, Mar. 26, 1968.)

## Netherlands

ASSISTS FISHING INDUSTRY

Again this year, the Danish Ministry of Agriculture and Fisheries is providing for the modernization of trawlers and cutters and for the breaking up and replacement of shrimp vessels. These objectives are part of a program to structurally improve the fishing industry.

Purposes of Loans

Contributions can be granted to trawlers and cutters for these purposes: to instal and improve refrigeration equipment (25 percent of costs to maximum of US$2,500; to rearrange fish holds (30 percent to maximum of $2,900 per trawler and $1,400 per cutter); instal hydraulically or electrically driven fishing winches, adjustable propellers, and sonar equipment (20 percent of costs). For trawlers: to install or improve deep-freeze equipment (20 percent of total cost to a maximum of US$36,200); for cutters: to instal washing-grading machines (30 percent to maximum of $725).

Other Aid

Another arrangement permits a $5,400 contribution to owners of shrimp vessels definitely withdrawn in 1968 from fishing operations from a Dutch port. If the owner simultaneously replaces the craft, the contribution is US$3,600 per vessel. If the vessel is also provided with a refrigeration installation, the contribution amounts to $6,200. ("Het Financieele Dagblad," Mar. 6, 1968; U. S. Embassy, The Hague, Mar. 12, 1968.)

## United Kingdom

### 1966-67 CATCH IN ENGLAND AND WALES

The British Ministry of Agriculture, Fisheries, and Food has reported these 1966-67 catch data for England and Wales:

| | 1967 | 1966 |
|---|---|---|
| | . . . (1,000 Lbs.) . . . . | |
| Cod | 656,863 | 614,203 |
| Haddock | 102,807 | 122,465 |
| Saithe | 72,985 | 79,609 |
| Plaice | 83,610 | 74,967 |
| Other | 160,804 | 164,651 |
| Total Demersal Fish | 1,077,069 | 1,055,895 |
| Herring | 27,700 | 28,697 |
| Other | 46,720 | 26,567 |
| Total pelagic fish | 74,420 | 55,264 |
| Total fish | 1,151,489 | 1,111,159 |
| Total shellfish | 61,919 | 46,844 |
| Grand total, England & Wales | 1,213,408 | 1,158,003 |
| Grand total, Scotland | 733,035 | 896,682 |
| Grand total, Great Britain | 1,946,443 | 2,054,686 |

Note: Original data in English hundredweights (cwt. = 112 lbs.)

* * *

### EXTRA SUBSIDIES GIVEN TO FISHING TRAWLERS

The United Kingdom provides extra subsidies for distant-water, wet-fish trawlers operating out of certain ports in England and Wales. Distant-water trawlers are to receive $19.20 more each day, middle-water trawlers an additional $16.80 a day, near-water trawlers $12.00.

This small additional subsidy is not expected to help this segment of the fishing industry; its difficulties are so deep and persistent that such aid is hopelessly inadequate.

Ports included in the subsidy are Hull, Grimsby, Fleetwood, North Shields, Milford Haven, and Hartlepool. ("Fishing News," Mar. 1, 1968).

* * *

### "FISHING NEWS" DIRECTORY AND EQUIPMENT GUIDE AVAILABLE

Many questions about the British fishing industry are answered in the 1968 "Fishing News" Directory and Equipment Guide. The book lists every government authority, organization, boat builder, supplier of equipment, manufacturer, and agent. Also, the book contains information on: vessels; owners and builders; propulsion; transmission; steering; electronics and radio; chandlery and lifesaving; catching and hauling; and marketing and processing.

The Guide is available from Fishing News Books Ltd., 110 Fleet St., London, E.C. 4, for US$5.

## Norway

### FISHING INDUSTRY GETS EXTRA SUBSIDY

Following a sharp exchange between nonsocialists and socialists, the Norwegian Parliament approved a Government bill proposing a 6 million kroner (US$850,000) subsidy to the fishing industry. Center Party Rep. Einar Moxnes, manager of the bill, said the proposal sought to offset the most damaging effects of the devaluation of the pound and other foreign currencies. Moxnes said that together with other measures being readied, this extraordinary support should help to create calmer conditions in the fishing industry.

#### First to Receive Aid

Fisheries Minister Oddmund Myklebust stated that the fishing industry is the first to receive aid to ease the devaluation impact. In his opinion, the subsidy amount should enable the fishing industry to continue operations and help to hold valuable markets. He expressed concern over the heavy reliance on subsidies and said other measures are also required to solve the problems of the fishing industry, notably better marketing methods.

#### Opposition Viewpoint

Speaking for the Labor Party, Rep. Ragnar Christiansen asserted that the Fisheries Minister's statements were a direct breach of promises made to fishermen. He said they also broke the preconditions for the government's decision not to devaluate the krone--namely, to give compensation to industries that suffered losses. ("News of Norway," Feb. 26, 1968.)

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Norway (Contd.):

WEST NORWAY HERRING FISHERY FAILS

According to mid-March 1968 information from West Norway, fishermen had landed 15,000 metric tons of fat herring--compared to about 390,000 by mid-March 1967. Unless the catch improves substantially, the situation must be termed catastrophic. So said Director Petter Haraldsvik of the Herring Sales Cooperative Association to a press conference at Kristiansund. More than half the 450 purse-seiners that operated out of Kristiansund in mid-February left to try their luck in North Norway.

Fishermen Remain Optimistic

Despite the very poor catch, Director Haraldsvik said, the mood of the fishermen still in Kristiansund is surprisingly optimistic. They trust chief fishery researcher Finn Devold's prognosis that a 500,000-ton herring catch is yet possible. ("News of Norway," Mar. 18, 1968.)

* * *

COASTAL FISHERIES ARE IN TROUBLE

Norway's coastal fisheries are in deep trouble. In West Norway, the worst snow storm in a generation kept the large herring fleet in port for several weeks. Now it is feared the herring will not reach their offshore spawning grounds due to a cold-water front.

In the Lofoten archipelago of North Norway, the sea is teeming with spawn-ready cod, and the catch is twice as large as last season's. But fish curers are asserting that prices have been fixed too high and refuse to buy, so fishermen are stuck with most of their catch.

In the northernmost province of Finnmark, nearly 80 percent dependent on its fishing industry, fish curers are saddled with large inventories of stockfish. The situation is really desperate, Fisheries Minister Oddmund Myklebust told the Norwegian "Journal of Commerce and Shipping."

Lofoten Cod Fishery

As of Feb. 17, 1,639 craft manned by 4,718 fishermen were engaged in the Lofoten cod fishery. Landings so far this season were 7,672 metric tons. This was 3,845 tons more than at the same time last year. But, due to the halt in buying, landings were getting markedly smaller.

More Herring

When the bad weather ended on the Møre coast, 9,000 fishermen who had been forced to remain idle in ports waited anxiously for word that the herring was running. Instead, they were told by fish researchers that due to a deep cold-water curtain the fat herring would probably not come all the way to the North Møre coast this year.

However, the fleet of 800 vessels, including 400 purse-seiners, was still waiting for a possible change. As of Feb. 22, fishermen had landed less than 1,000 tons of fat herring, as against 310,000 tons on that date last year. ("News of Norway," Mar. 4, 1968.)

## Bulgaria

BUILDS FISHING VESSELS FOR USSR

When Bulgaria entered the Agreement on Cooperation in High Seas Fisheries (signatories: USSR, Poland, East Germany), she was approached by the Soviet Government about building small fishing vessels for the USSR. In 1965, technical designs for a new class of vessels were prepared. But it was not until 1967 that a contract was signed between Moscow's SUDOIMPORT and Sofia's KORABOIMPEKS, both vessel-importing and exporting state-owned firms.

Vessels are built in Burgas Shipyards on Bulgaria's Black Sea coast. The first one was launched in February 1968. By 1970, about 120 of those new 311-displacement-ton vessels will be shipped to the USSR, which will use them mostly in her North Sea and Baltic (and possibly Barents Sea) fisheries.

The Vessels

The vessels are 30 meters (98.4 feet) long, 7 meters (23 feet) wide. They have refrigerated hold capacity of about 100 metric tons. The 300-hp. motor can develop about 9.5 knots. With a crew of 19, the vessels will have sea endurance of 19 days. Most of the

Bulgaria (Contd.):

catch will be lightly salted and refrigerated. In 1968, Bulgaria plans to construct 46 such vessels for the USSR. ("Transporten Glas," Feb. 1968.)

## Portugal

### PRODUCTION AND EXPORTS OF FISH MEAL AND OIL

The Portuguese National Institute of Statistics reports these statistics on the production and exports of fish meal and oil:

| | Production | | | Exports | | |
|---|---|---|---|---|---|---|
| | 1967 (Jan.-Sept.) | 1966 | 1965 (Rev.) | 1967 (Jan.-Nov.) | 1966 | 1965 (Rev.) |
| | . . . . . . . . . . . . . . . . . . . (Metric Tons) . . . . . . . . . . . . . . . . . . . . | | | | | |
| Oils . . . . . . . . . . . . . . . . . . . | 1/ | 10,343 | 11,300 | 7,150.3 | 11,608.6 | 11,322.1 |
| Cod-liver oil & others . . . . . . . . . . | 1/ | 3,776 | 3,801 | 3,602.5 | 3,410.6 | 3,463.8 |
| Sperm & whale oil . . . . . . . . . . . . | 1/ | 1,986 | 2,098 | 656.9 | 2,764.9 | 1,674.1 |
| Sardine oil & other fish oil . . . . . . . | 2,052 | 4,581 | 5,401 | 2,890.9 | 5,433.1 | 6,134.1 |
| Fish meal . . . . . . . . . . . . . . . . | 1/ | 2,072 | 1,594 | 3,167.2 | 3,632.3 | 2,182.1 |
| Fish waste . . . . . . . . . . . . . . . . | 1/ | 27,532 | 33,282 | 1/ | 4,905.7 | 7,708.9 |

1/Not available.

## Greece

### 1967 CATCH WAS DOWN

Greece's total landings (unofficial) in 1967 were 102,317 metric tons, compared with 108,082 tons in 1966. The decline was caused by lower catches in the inshore fishery; the high-seas fishery increased.

In the Atlantic fishing area (and including Indian Ocean and South African waters), declining production in northwest African grounds is causing alarm. More trawlers operating in Libyan waters accounted for increased catches in the Mediterranean fishing area. Midwater fishing was successful only for mackerel. A reduction in available stocks, believed caused by natural causes, is responsible for the smaller production in coastal and inland waters. ("Alieia," Feb. 1968.)

| | 1967 | 1966 |
|---|---|---|
| | . . . .(Metric Tons). . . . | |
| Atlantic . . . . . . . . . . . . | 31,817 | 29,582 |
| Mediterranean and other-than-Greek waters . . . . . . . . . | 4,000 | 3,500 |
| Midwater . . . . . . . . . . . | 42,000 | 47,000 |
| Coastal . . . . . . . . . . . . | 14,000 | 16,000 |
| Inland waters . . . . . . . . . | 10,500 | 12,000 |
| Total . . . . . . . . . . . | 102,317 | 108,082 |

## Denmark

### GREENLAND SEAL SKINS AUCTIONED

On March 15, 1968, an auction of Greenland seal skins was held at the Danish Fur Sales, Copenhagen, for the Royal Greenland Trade Department. Virtually all skins offered--25,896--were sold. The upward price trend evident at the Sept. 5, 1967, sale continued. The next auction of seal skins is scheduled for Sept. 5, 1968. (U.S. Embassy, Copenhagen, Mar. 22, 1968.)

| Type of Seal | No. of Skins Sold | Grade | | Avg. Price | Top Price |
|---|---|---|---|---|---|
| | | | | . . (US$) . . | |
| Ringed | 310 | 1A1/ | washed | 15.64 | 19.55 |
| | 1,204 | 1B | washed | 10.83 | 14.29 |
| | 5,010 | 2A | washed | 8.80 | 13.16 |
| | 2,294 | 2B | washed | 6.54 | 10.22 |
| | 502 | 2C | | 2.70 | 6.61 |
| | 1,388 | 2C | washed | 5.56 | 8.87 |
| | 7,581 | 3A | washed | 9.77 | 15.04 |
| | 1,140 | 3B | | 4.06 | 4.96 |
| | 2,508 | 3B | washed | 6.69 | 11.13 |
| | 2,098 | 3C | | 1.58 | 2.86 |
| Total ringed | 24,035 | | | | |
| Harp | 788 | 3A | washed | 10.15 | 18.80 |
| | 40 | 3B | washed | 5.71 | 5.71 |
| | 34 | 3C | | 2.63 | 3.46 |
| Total harp | 862 | | | | |
| Saddle | 240 | 3 | washed | 9.10 | 15.04 |
| Bladdernosed | 31 | 1 | washed (Bluebacks) | 17.44 | 18.80 |
| | 96 | 2 | washed (Bluebacks) | 10.75 | 16.16 |
| | 592 | 3 | washed | 9.02 | 26.69 |
| Total bladdernosed | 719 | | | | |
| Grand total | 25,856 | | | | |

1/Forty 1A washed skins were not sold; these were the only skins offered but not sold at this auction.

## Spain

### VIGO IS EUROPE'S NO. 1 FISHING PORT

The Spanish port of Vigo is now Europe's largest fishing port. Its sudden emergence as the leading port is attributed to the large increase in landings of frozen fish caught by Spanish trawlers off South Africa. Landings in 1967 at Vigo were about 152,000 metric tons, more than 10 percent above 1966.

* * *

### A PROMISING TUNA MARKET

Market research conducted by the Japan External Trade Organization (JETRO) reveals that Spain has entered the tuna fishery. Spain is a much more promising frozen-tuna market than any other European country.

Spain is expected to increase the number of fishing vessels and catches. She now has 13 tuna fishing vessels equipped with freezing facilities; there were only 2 pelagic tuna fishing vessels in 1963. She is steadily building new tuna vessels with modern freezing facilities.

#### Largest European Production

Spain's tuna catch in 1965 was 42,000 tons--the largest by a European country, including Italy and France. Spaniards and Japanese have much in common as far as diet goes. Consumption of canned tuna in Spain is increasing yearly as national income increases. Spain has not exported frozen tuna since 1964. Therefore, it is unlikely that Spain will turn to a frozen-tuna export country unless many more tuna fishing vessels are built.

#### Promising Market for Japan

Unlike the Italian market, canned albacore is most favored by Spaniards; so Spain is a good customer of Japan. Spanish statistics show room for a promising market for Japan's exports of tuna: Spanish imports of frozen tuna for canning were 836 tons (514 tons from Japan) in 1963, 687 (388) in 1964, 8,181 (6,343) in 1965, and 2,216 (1,584) in 1966.

#### Albacore Market

Spain is developing into a supplier of marine products to the European Economic Community (EEC). She is a promising market for frozen tuna (especially albacore) because of her canning capabilities. This will be true as long as import restrictions are not imposed. ("Suisan Keizai Shimbun," Mar. 5, 1968.)

## France

### OCEAN STUDY WILL HELP FISHING

A comprehensive scheme of oceanography to be announced by the Centre National pour l'Exploration des Oceans (CNEXO) is likely to play a big part in the future of the French fishing industry.

The program will include intensive research into fish populations and migration, mineral content of the oceans, water pollution, and the effect of interactions between sea and atmosphere.

#### Sub and Bathysphere

The 2,200-ton research vessel "Jean-Charcot" will be joined by a submarine now being built and equipped specially to observe life down to 2,000 ft. The bathysphere "Archimede" will work greater depths.

The possibility of creating new fishing grounds by "sowing" fresh banks of plankton will be studied. Some scientists are convinced this can be done--and that the fish will quickly learn the locations of this food supply and breed there.

CNEXO, in existence only a few months, already has made a start on the work for which it was created. M. La Prairie is its director-general. ("Fishing News International," March 1968.)

## Ireland

### FISHING INDUSTRY GROWTH CONTINUES, REPORTS BOARD

Landings increased in 1966, exports compared with those in 1965, and home consumption of fishery products continued upward. This is reported by the Irish Sea Fisheries Board (ISFB) in its fifteen annual report 1966/67.

The yearly increase in landings are resulting in an accelerated rate of investment in the industry and this should produce further expansion of industrial activity. "However," ISFB states, "the achievement of targets for the industry demand a much higher input of capital." ISFB is studying ways of getting more financing; it also is giving attention to a promotion program that would encourage greater investment in the processing sector of industry.

Exports a Key to Growth

Increased investment in boats depends on satisfactory growth in market outlets. Irish domestic needs for edible fish "are easily satisfied" during periods of heavy landings. The industry must export more fresh and processed fishery products. ISFB states that the closeness to Britain "should encourage us to develop a regular export trade in fresh fish to this market"--of high enough quality to make it easy to promote at premium prices. "The establishment of quality standards for fishery products is an urgent requirement."

ISFB reported "considerable progress in improving gear operating efficiency on boats. The educational and training programmes introduced in the ports were very well supported by fishermen," but much remains to be done in educational field.

Production

The value of fish landed in 1966 was 20% above 1965. A major factor was the rise in quantity and value of pelagic fish landed (particularly herring): 40% in quantity and 56% in value over 1965.

Table 1 - Quantity and Value of Sea Fish (Excluding Salmon) Returned as Landed in 1965 and 1966

| Kinds of Fish | 1966 | | 1965 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | CWT. | £ | CWT. | £ |
| Demersal | | | | |
| Soles . . . . . . | 3,057 | 71,060 | 3,741 | 84,565 |
| Brill . . . . . . | 1,264 | 13,733 | 2,120 | 22,665 |
| Turbot . . . . . | 1,491 | 15,936 | 2,042 | 21,164 |
| Plaice . . . . . | 28,117 | 222,668 | 23,828 | 181,609 |
| Dabs . . . . . . | 3,827 | 10,053 | 4,443 | 12,056 |
| Mergrims . . . . | 4,295 | 16,316 | 4,698 | 15,979 |
| Other flat fish . . | 2,635 | 11,245 | 2,491 | 9,139 |
| Ray/Skate . . . | 22,418 | 90,164 | 23,879 | 98,678 |
| Cod . . . . . . . | 38,839 | 153,238 | 32,306 | 131,917 |
| Haddock . . . . | 29,087 | 106,222 | 34,397 | 106,451 |
| Hake . . . . . . | 1,551 | 15,827 | 1,765 | 11,653 |
| Whiting . . . . . | 99,248 | 215,634 | 108,164 | 211,308 |
| Pollack . . . . . | 11,423 | 30,532 | 13,187 | 34,176 |
| Other round fish . | 25,239 | 23,075 | 25,131 | 18,002 |
| Total demersal | 272,491 | 995,703 | 282,192 | 959,362 |
| Pelagic | | | | |
| Herrings . . . . | 293,300 | 399,312 | 210,555 | 251,521 |
| Pilchards . . . . | 360 | 198 | 39 | 157 |
| Mackerel . . . . | 29,645 | 46,389 | 40,213 | 45,853 |
| Sprats . . . . . . | 30,520 | 12,573 | 29,678 | 12,218 |
| Total pelagic . | 353,825 | 458,472 | 280,485 | 309,749 |
| Total wet fish . | 626,316 | 1,454,175 | 562,677 | 1,269,111 |
| | Nos. | | Nos. | |
| Shellfish | | | | |
| Lobsters . . . . . | 491,668 | 231,482 | 362,851 | 150,415 |
| Crawfish . . . . | 160,693 | 117,553 | 163,899 | 108,147 |
| Crabs . . . . . . | 49,582 | 1,336 | 118,593 | 2,207 |
| Escallops . . . . | 309,454 | 9,584 | 197,668 | 5,342 |
| Oysters . . . . . | 1,387,201 | 29,871 | 1,465,179 | 31,084 |
| | CWT. | | CWT. | |
| Dublin Bay prawns | 24,735 | 83,275 | 15,769 | 62,287 |
| Mussels . . . . . | 15,134 | 7,617 | 18,597 | 7,627 |
| Periwinkles . . . | 45,179 | 84,584 | 33,356 | 58,052 |
| Other shellfish . | 3,666 | 13,859 | 2,408 | 6,101 |
| Total value shellfish . . . | - | 579,161 | - | 431,262 |
| Grand total value | - | 2,033,336 | - | 1,700,373 |

Source: Department of Agriculture and Fisheries.

The total value of shellfish landed rose one-third. Although the value of demersal fish landed increased, quantity declined from 1965. Responsible for the decline were the greater concentration by many larger craft

Ireland (Contd.):

in pelagic fishing--and increased fishing of crustaceans.

Fish Resources

The demersal resources around Ireland's coasts continued to produce fair catches for more boats. There was increased fishing and landings of existing herring stocks--particularly off the North Mayo Coast and in South Eastern fishery.

The greater use of the mid-water trawl greatly helped this expansion. A Norwegian boat introduced local fishermen to purse seining in Irish waters.

Concerning shellfish, there were resource investigations on shrimps, escallops, and lobsters. New gear and equipment were introduced into lobstering. Many lobster and crawfish boats now use the new American parlour lobster pot. They are also installing hydraulic hauling equipment.

Market Development

In 1966, per-capita fish consumption rose 5% over 1965. The figure is 10.1 lbs. per person per year. Exports of fresh and processed seafish increased 47%--to ₤1,522,000, up ₤660,000 over the previous years.

Exports of processed fish products showed "very satisfactory growth." This was particularly true of salted herring exports to France. Processed fish exports were worth ₤609,000; the 1965 figure was ₤297,000.

"The significant increase in fish consumption on the home market was reflected in improved fish distribution throughout the country." Regional wholesalers were helped to develop regular, extensive, distribution services to retailers.

Table 2 - Imports and Exports of Fish and Fishery Products in 1966 as Compared with 1965

| | 1966 | | 1965 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | CWT. | ₤ | CWT. | ₤ |
| Imports | | | | |
| Fish, fresh, chilled or frozen . . . . . | 20,307 | 85,212 | 21,604 | 78,325 |
| Fish, cured--not in airtight containers | 28,395 | 205,275 | 30,983 | 229,797 |
| Fish and fish preparations in airtight containers . . . . | 32,757 | 688,808 | 28,733 | 661,673 |
| Other fish and fish preparations . . . | 11,867 | 266,707 | 9,741 | 233,689 |
| Totals . . . . . | 93,326 | 1,246,002 | 91,061 | 1,226,026 |
| Exports | | | | |
| Fish, fresh, chilled or frozen: | | | | |
| Salmon . . . . . | 17,159 | 782,334 | 19,420 | 723,779 |
| Herrings . . . . . | 100,434 | 217,755 | 68,760 | 138,654 |
| Freshwater eels . | 6,075 | 106,218 | 8,433 | 120,944 |
| Other fish . . . . | 15,338 | 217,710 | 19,301 | 236,389 |
| Fish, dried, salted or smoked not in airtight containers | 97,089 | 351,948 | 17,695 | 108,677 |
| Shellfish, fresh, chilled, frozen, salted, dried . . | 68,489 | 703,012 | 61,917 | 566,192 |
| Other fish and fish preparations . . . | 2,441 | 113,554 | 2,534 | 77,248 |
| Totals . . . . . | 307,025 | 2,492,531 | 198,060 | 1,971,883 |

Source: Department of Agriculture and Fisheries.

Fish Processing Standards

During 1966, the first standard for processing fish products was developed. It was the work of ISFB, the Irish Institute for Industrial Research and Standards, and the Department of Agriculture and Fisheries. This standard will be followed by others covering all seafood products processed in Ireland for home use and for export. Companies that meet these standards will be licensed to carry the Institute's symbol of quality.

# LATIN AMERICA

## Mexico

### SETS CLOSINGS AND SIZES FOR SPINY LOBSTERS, SHRIMP, TURTLES

Mexico has announced the following closed seasons and minimum size limits for spiny lobsters, shrimp, and turtles:

| | Closed Season | Minimum Size |
|---|---|---|
| Spiny lobster | Mar. 16-July 15 (Gulf & Caribbean) | 145 mm. tail length, measured from tip of tail to base of carapace |
| Red spiny lobster | Mar. 16-Sept. 30 (Baja Calif., from U. S. border to Punta Entrada) | 82 mm. carapace length |
| Blue & green spiny lobsters | July 1-Sept. 15 (Baja Calif., south of Isla Margarita, all of Gulf, and rest of Pacific Coast) | 82 mm. carapace length |
| Shrimp[1/]: (a) Bays, estuaries, lagoons (b) Ocean | Apr. 16-Sept. 1 (Sonora, Sinaloa, Nayarit) July 15-Sept. 15 (Sonora, Sinaloa, Nayarit) | 125 mm. overall length |
| Marine turtles | June 1-Sept. 30 (all of Pacific Ocean and Gulf of Calif., except northern Gulf and Pacific coast between Todos Santos and U. S. border) | Varies with species |

1/Caribbean fisheries not affected.

* * *

### FRENCH EXPLORATORY FISHING VESSEL GOES ON REEF

The French vessel "Adrian Pla" conducted exploratory fishing and on-board processing under a recent French-Mexican technical assistance agreement. Three trips were completed, each with Mexican biologists and fishermen aboard.

The first trip was along the north shore of Yucatan; the second in the Bay of Campeche; and the last along Yucatan's east coast. Shrimp and incidental species were sorted, packed, and frozen on board. The French captain reported that the Mexicans were interested primarily in snapper and shrimp, which were not taken in sufficient quantities to pay for the vessel's operation.

Runs Onto Reef

On March 6, during the last trip, the vessel ran onto a reef 14 miles south of Isla Mujeres and was first reported in danger of sinking. Later towed off, it continued to explore on the way to a shipyard.

There was much comment in the Mexican press on entrusting a million-dollar vessel to a skipper without sufficient knowledge of local waters. Reportedly, the French captain was relieved of his command. (U. S. Consulate, Merida, March 8; various sources.)

## Honduras

### ORDERS SHRIMP VESSELS FROM SPANISH FIRM

Several shrimp vessels are being built for Honduras at the Celaya (Spain) shipyards for about US$1,000,000. The vessels are 87 feet long, 21 feet wide, with a deadweight of 104 tons.

They will have refrigerator holds with a storage capacity of 3,500 cubic feet. The cruising speed will be 10.5 knots. ("Mexico City News," March 2, 1968.)

## Argentina

### CATCH AND OUTPUT OF FISHERY PRODUCTS CONTINUE UPWARD

The 1967 Argentine fishery catch continued the upward trend of recent years: It was 8 percent above 1966. The catches of hake, anchovy, bonito, pargo, shrimp, centolla, squid, and octopus increased; catches of tuna, langostino, and mussels declined. Algae and inland fish production also increased.

For the first time, exports of fishery products outpaced imports: US$3,612,300 of products were exported; imports were $1,260,400.

Argentina (Contd.):

Unloading and packing fish at Mar del Plata, Argentina.

| Catch and Production 1965-67 | | | |
|---|---|---|---|
| | 1/1967 | 1966 | 1965 |
| | . . . . . . . (Metric Tons) . . . . . . . | | |
| CATCH: | | | |
| Total. . . . . . . . | 271,748 | 250,826 | 205,044 |
| Marine . . . . . . . | 226,897 | 211,066 | 172,107 |
| SELECTED SPECIES: | | | |
| Hake . . . . . . | 75,605 | 68,498 | 76,617 |
| Anchovy . . . . | 13,416 | 10,978 | 16,561 |
| Tuna . . . . . . | 948 | 1,195 | 1,674 |
| Bonito. . . . . . | 1,230 | 490 | 138 |
| Bream. . . . . . | 9,544 | 7,516 | 4,074 |
| Total fish . . . | 183,258 | 201,519 | 163,198 |
| Shrimp . . . . . | 411 | 207 | 390 |
| Centolla . . . . | 226 | 106 | 52 |
| Langostino . . . | 204 | 406 | 275 |
| Squid . . . . . . | 2,266 | 1,031 | 417 |
| Mussels . . . . . | 5,750 | 5,865 | 6,587 |
| Octopus . . . . . | 1,406 | 867 | - |
| Algae . . . . . . | 32,006 | 29,668 | 19,907 |
| Inland . . . . . . | 12,845 | 10,091 | 13,030 |
| PRODUCTS: | | | |
| Fish meal . . . . | 24,517 | 22,067 | 15,787 |
| Canned fish . . . | 9,670 | 15,489 | 17,883 |
| Frozen fish . . . | 4,250 | 4,997 | 8,136 |
| Exports (Qty.) . . . | 15,043 | 13,210 | 9,260 |
| " (Value). . . | (US$3,612,300) | ($2,791,162) | ($1,418,270) |
| Imports (Qty.) . . . | 2,716 | 10,608 | 20,012 |
| " (Value). . . | ($1,260,400) | ($3,513,703) | ($4,110,195) |

1/Preliminary data.

## Fishery Products

In the filleting industry, economic problems beset the 21 plants operating in 1967 and prevented expanded production over 1966. In the fish-meal industry, 23 plants operated (12 for marine fish and 11 for fresh-water species), but only 18 worked all year. Fish-meal production increased 9 percent; production of canned and frozen fish declined.

At year's end, 67 vessels capable of high-seas fishing were registered, as well as 317 inshore vessels and 42 smaller craft. (Direccion General de Pesca y Conservacion de la Fauna, Buenos Aires, March 19, 1968.)

# ASIA

## Japan

### TRAWL FISHERY PRODUCTION IN NORTHERN WATERS

The Japanese Fisheries Agency reports northern waters trawl fishery production by mothership fleets during 1967 as 771,157 metric tons in the Bering Sea, and 132,960 metric tons in the Gulf of Alaska.

The 1967 Bering Sea catch surpassed the 1966 landings of 441,374 tons by 329,783 tons--by about 75 percent. This was due primarily to the sharp increase in Alaska pollock landings: in 1967, 566,437 tons; in 1966, 265,605 tons. Alaska pollock is the principal species used in making fish meal and minced meat.

The Gulf of Alaska catch in 1967 was nearly 40 percent above 1966's 95,045 tons. It was attributed to the entry of more trawlers into the fishery in fall 1967.

#### Fishing Areas Enlarged

On Sept. 1, 1967, the Fisheries Agency enlarged the Bering Sea and Gulf of Alaska fishing areas. It also redesignated the Gulf fishery as the Northern Area Distant-Water Trawl Fishery.

The Bering Sea area was enlarged to include waters bounded by 160° E. and 170° W. longitudes north of 50° N. latitude. Previously, the eastern boundary of that fishery south of the Aleutian Islands was 175° W. longitude, and the western limit was 170° E. longitude.

The Gulf of Alaska fishing grounds were expanded broadly; they encompass the North Pacific Ocean and the Bering Sea east of 170° E. longitude, north of 10° N. latitude. The 10th parallel falls close to Puntarenas, Costa Rica. ("Suisan Shuho," March 5, 1968, and other sources.)

Table 1 - Bering Sea Mothership-Type Bottomfish Production, 1957-67

| Year | No. Mother-ships | Catcher Vessels | Flatfish | Turbot | Halibut | Cod | Alaska Pollock | Sablefish | Rockfish | Shrimp | Herring | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Metric Tons) | | | | | | | | | | |
| 1967 1/ | 14 | 1/170 | 75,689 | 22,566 | 1,188 | 31,905 | 566,437 | 7,392 | 30,540 | 3,286 | 31,449 | 705 | 771,157 |
| 1966 | 14 | 171 | 59,698 | 12,531 | 944 | 19,693 | 265,605 | 6,844 | 45,938 | 2,934 | 25,213 | 1,974 | 441,374 |
| 1965 | 14 | 214 | 23,978 | 10,321 | 1,622 | 19,515 | 231,658 | 3,758 | 46,505 | 9,761 | 33,426 | 737 | 381,281 |
| 1964 | 14 | 228 | 65,728 | 33,029 | 2,448 | 19,442 | 178,560 | 8,030 | 44,162 | 20,883 | 42,887 | 275 | 415,444 |
| 1963 | 19 | 255 | 35,346 | 29,305 | 9,668 | 15,483 | 113,695 | 19,997 | 25,428 | 31,612 | 31,619 | 233 | 312,386 |
| 1962 | 23 | 290 | 288,690 | 58,226 | 9,898 | 9,671 | 59,536 | 28,381 | 12,527 | 18,005 | 9,946 | 3,701 | 498,581 |
| 1961 | 33 | 380 | 398,956 | 57,335 | 11,141 | 6,834 | 24,398 | 26,182 | 13,705 | 10,225 | 73,901 | 796 | 623,473 |
| 1960 | 13 | 180 | 360,103 | 36,843 | 6,931 | 5,679 | 26,097 | 1,861 | 1,507 | 680 | 403 | 9,828 | 449,932 |
| 1959 | 7 | 68 | 120,704 | - | 2,240 | 3,632 | 32,793 | 393 | 9 | - | - | 379 | 160,150 |
| 1958 | 4 | 33 | 39,153 | - | 1,271 | 223 | 6,924 | 32 | 1 | - | - | 147 | 47,751 |
| 1957 | 4 | 13 | 24,145 | - | - | - | - | - | - | - | - | - | 24,145 |

1/From September 1, 1967, mothership fleet was reduced to 12 fleets and catcher vessels increased to 173.

Table 2 - Northern Area (Gulf of Alaska 1/) Distant-Water Bottomfish Production, 1960-67

| Year | No. Mother-ships | Catcher Vessels | Flatfish | Turbot | Cod | Alaska Pollock | Sablefish | Rockfish | Shrimp | Herring | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Metric Tons) | | | | | | | | | |
| 1967 | 11 | 33 | 1,826 | 5,004 | 3,047 | 7,585 | 8,483 | 97,930 | 1,191 | - | 7,894 | 132,960 |
| 1966 | 7 | 7 | 766 | 4,701 | 1,349 | 9,235 | 3,701 | 73,435 | 353 | - | 1,505 | 95,045 |
| 1965 | - | 6 | 616 | 1,363 | 700 | 2,709 | 2,858 | 43,631 | 81 | 1 | 483 | 52,442 |
| 1964 | 1 | 6 | 65 | 583 | 166 | 1,161 | 1,099 | 13,715 | 2,845 | - | 424 | 20,058 |
| 1963 | - | 6 | 177 | 465 | 130 | 729 | 1,840 | 6,165 | 657 | 4 | 98 | 10,265 |
| 1962 | - | 2 | 26 | - | 9 | 12 | 38 | 80 | 5 | - | 16 | 186 |
| 1961 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1960 | - | 8 | - | - | - | - | - | - | - | - | - | 2/ 306 |

1/Gulf of Alaska fishery was redesignated as Northern Area Distant-Water Bottomfish Fishery on September 1, 1967. The fishery was permitted to be conducted experimentally during the period 1960 to May 1965, and from June 1965 it was designated as a mothership-type fishery and licensed for full-scale commercial operations.
2/Catch composition is not given in the original Japanese table.

* * *

Japan (Contd.):

## CANNED OYSTER EXPORTS HIT RECORD IN 1967

Japan's exports of canned oysters in 1967 were a record 869,000 cases--more than 200,000 cases above 1966. Exports of canned oysters boiled in water were 80 percent higher than 1966; exports of canned smoked oysters in oil only increased 23,000 cases over 1966. Total exports and major destinations:

| Product | Country | Actual Cases | |
|---|---|---|---|
| | | 1967 | 1966 |
| Canned smoked oysters in oil, 3 B-square ($\frac{1}{4}$-lb. sardine-style), 50/case | U. S.<br>Canada<br>Australia | 291,364<br>82,438<br>33,738 | 277,823<br>55,158<br>50,886 |
| Total. . . . . . . . . . . | | 447,476 | 424,147 |
| Canned oysters boiled in water, No. 7 ($\frac{1}{2}$-lb. flat), 48/case | U. S.<br>Canada<br>Australia | 370,472<br>24,009<br>7,866 | 201,522<br>14,736<br>6,553 |
| Total. . . . . . . . . . . | | 412,298 | 230,779 |
| Other canned oysters, No. 7 ($\frac{1}{2}$-lb-flat), 48/case | U. S. | 5,548 | 4,900 |
| Total. . . . . . . . . . . | | 9,090 | 8,233 |
| All products | U. S.<br>Canada<br>Australia | 667,384<br>106,829<br>42,326 | 484,245<br>70,132<br>59,856 |
| Grand total . . . . . . . . | | 868,864 | 663,159 |

(Fishery Attaché, U. S. Embassy, Tokyo, from "Suisan Tsushin," March 1, 1968.)

* * *

## 1967 SALMON CATCH WAS GOOD

The Fisheries Agency reported Feb. 28, 1968, that the 1967 Japanese North Pacific salmon catch in the areas of the Japan-USSR Fisheries Treaty was 114,873 metric tons: 52,333 tons in Area A (north of 45° N. latitude) and 62,540 tons in Area B (south of 45° N. latitude).

Japan's 1967 catch quota was 108,000 tons; 52,500 tons allotted to Area A, and 55,500 tons (plus 10-percent allowance) for Area B.

### Coastal Fishery

The Japanese coastal fishery harvested 13,581 tons to September 1967. This brought total salmon catch for 1967 to 128,454 tons. It was about 10,000 tons below the 142,001-ton catch in 1965 which, like 1967, was a good pink salmon year. The Fisheries Agency states that the 1967 catch should approximate 1965's, when the coastal fishery catch for the entire year is tabulated.

### Species Makeup of Catches

The species composition of the 1967 salmon catches in Areas A and B and the coastal fishery was (1965 figures in parentheses): reds 20,493 tons (25,016 tons), chums 38,896 tons (45,739 tons), pinks 64,223 tons (62,991 tons), silvers, kings, and others 4,842 tons (8,255 tons); total 128,454 tons (142,001 tons). ("Shin Suisan Shimbun," Feb. 27, 1968.)

* * *

## FROZEN TUNA EXPORT QUOTAS REDUCED

On March 7, the Japan Export Frozen Tuna Producers Association adopted new export quotas for frozen tuna exports in Business Year 1968--April 1968-March 1969. ("Suisancho Nippo," Mar. 9, 1968, and other sources.)

| | BY 1968 | BY 1967 |
|---|---|---|
| | . . (Short Tons) . . | |
| Direct shipment to U. S. from Japan: | | |
| Albacore. . . . . . . . . . . . . . . . | 30,000 | 35,000 |
| Yellowfin . . . . . . . . . . . . . . . | 25,000 | 35,000 |
| Loins. . . . . . . . . . . . . . . . . . | 6,000 | 8,000 |
| Additional quota: | | |
| Albacore . . . . . . . . . . . . . . . | 10,000 | - |
| Loins . . . . . . . . . . . . . . . . . | 2,000 | - |
| Indian Ocean transshipment to U. S.: | | |
| Albacore and yellowfin . . . . . . . . | 4,000 | 4,000 |
| Atlantic Ocean transshipment to U. S.: | | |
| Albacore. . . . . . . . . . . . . . . . | 20,000 | 25,000 |
| Additional quota, all tuna species. . . | 3,000 | 5,000 |
| Quota for new members . . . . . . . . | 200 | - |
| Overseas bases[1] quota . . . . . . . . . | 4,000 | 4,000 |
| | . . (Metric Tons) . . | |
| Italian quota: | | |
| Transshipment & direct export. . . . . | 40,000 | 40,000 |
| Additional quota . . . . . . . . . . . | 3,500 | 500 |

1/Includes American Samoa, Espiritu Santo (New Hebrides), Fiji Island, Penang (Malaysia), and Saint Martin Island (West Indies).

* * *

## REPORT ON TUNA FLEET OPERATIONS

In the last year or two, the main body of the Japanese tuna fleet has been concentrating on fishing more for the domestic market than for exports. Many long-liners have been fishing in the Tasman Sea off southeastern Australia. However, with the seasonal slowdown

Japan (Contd.):

there, a large number of those vessels are shifting to the Indian and Atlantic Oceans.

Japanese fleet operations in various ocean areas are:

Indian Ocean: About 90 long-liners are there, mostly concentrated between equator and 10° S. latitude. Practically none is fishing in the high latitude grounds south of 15° S. latitude.

Yellowfin fishing in western Indian Ocean off Mombasa, Kenya, is reported very good; many vessels are landing 3-4 tons, and as much as 6 tons, per day. Most vessels are equipped with a low-temperature, quick-freezing system and are bringing catches back to Japan. Albacore landings in the Indian Ocean are very small.

Atlantic Ocean

The Atlantic tuna fleet, which dwindled in the past few years, has been building up slowly. There are now about 70 vessels in operation. Close to 30 vessels are off Africa's west coast, near Pointe Noire. They are making good catches of yellowfin and big-eyed tuna; daily landings average 4-5 tons per vessel.

In the central Atlantic, about 20 vessels are fishing primarily for yellowfin and big-eyed; daily catches average 2.5-3 tons.

Off Puerto Rico, about 15 long-liners fishing for albacore are landing between 2-2.5 tons per vessel a day.

Seven to 8 vessels are off Angola, catching predominantly albacore--between 2.5-4 tons of fish a vessel.

South Pacific Ocean

Vessels operating out of American Samoa and other South Pacific tuna bases find very poor fishing. Landings in February and March 1968 averaged about one ton a day.

Tasman Sea

Fishing is very slow. Full-scale fishing in this region starts around July. ("Suisan Tsushin," March 28.)

3 MORE TUNA PURSE SEINERS LICENSED FOR W. AFRICA

On March 12, the Japanese Fisheries Agency licensed 3 more purse seiners for the West African "experimental" tuna purse-seine fishery. The 3 were selected from 38 license applications. Now there are 9 in that fishery. The previous 6 were 4 two-boat seiners now off West Africa and 2 one-boat seiners scheduled to begin this year.

Smaller Fleet In Wider Area

The Agency decided not to enlarge the fleet beyond 9. By having a smaller fleet operate over a wider area, it felt it could assess better the purse-seine method's effectiveness. If the performance of the 9 is satisfactory, the Agency intends to license their operation on a commercial scale.

Purse Seiners' Better Results

In the West African tuna fishery, other countries, including Spain, France, Yugoslavia, the U. S., and Canada, are also purse-seining for tuna.

Japanese purse seiners which began operating in 1964 are progressively achieving better results in skipjack and yellowfin fishing. It is conceivable that Japanese tuna fishing off West Africa may eventually shift from traditional long-lining to purse seining. ("Suisan Keizai Shimbun," Mar. 14, and other sources.)

* * *

FRESH AND FROZEN TUNA PRICES

Albacore tuna prices on the Japanese domestic market in the latter part of March 1968 were holding steady at around exvessel US$454 a short ton. Yellowfin prices were softening somewhat, bringing around exvessel $365 a short ton. Frozen round albacore for export to the U. S. have undergone very little price change in the past 6 months; these have been averaging $515 a short ton, c. & f., delivery California. Gilled-and-gutted yellowfin were being sold to California packers in March at around $435 a short ton, c. & f.

Atlantic Albacore

Prices for Atlantic-caught albacore (round) exported to Puerto Rico have been holding

Japan (Contd.):

steady. In early March 1968, prices were quoted at $450 a short ton, f.o.b. Sao Vicente, Cape Verde Island. Early March 1968 prices for other tuna transshipments to Puerto Rico from that island were: yellowfin (g. & g.) f.o.b. $395 per short ton; big-eyed (g. & g.)--$260 per short ton. ("Suisan Tsushin," Mar. 30, and "Suisan Shuho," Mar. 25.)

* * *

### DISTANT-WATER BOTTOMFISH ASSOCIATION FORMED

The Japan Distant-Water Bottomfish Fishery Association was formed March 26, 1968. It represents 41 Japanese trawling firms operating 12 motherships and 116 distant-water trawlers. It combines the Overseas Trawler Association and the Northern Water Bottomfish Association, both dissolved and enlarged into a single organization.

Masao Okai, Vice President, Kyokuyo Hogei Fishing Co., was named board chairman and executive director.

1968 Plans

Business plans for 1968 include: (1) promote settlement of international fishery problems; (2) improve communication with private organizations in coastal countries; (3) collect foreign information and assess international situation; (4) advise on ways of increasing effectiveness of fishing ground exploratory surveys undertaken by the government-operated research vessel "Kaiyo Maru." ("Suisancho Nippo," March 28, 1968.)

## India

### SHRIMP INDUSTRY CONTINUES TO EXPAND

For the first time, India's Madras State is actively exporting shrimp. This recent development follows the building of a fleet of 591 mechanized boats. Boats ranging from 25 to 42 ft. are being turned out by the 4 yards at Royapuran, Nagapattinam, Marina, and Mandapam.

Shrimp are about 4 percent of total landings in Madras State. Landings there have increased from 100,000 tons before the 5-year plan to 250,000 tons now. Though shrimp landings are small, the potential is considerable. With more systematic and organized trawling, the catch could be tripled within 2 years.

Four ocean-going trawlers, each capable of landing 100 tons of fish a year, are being built in Calcutta.

Three freezing plants are being erected at Ennore, Mandapam, and Tuticorin. They will have a total capacity of 16 tons a day.

Madras State provides the bulk of spiny lobster tails exported from India. The lobster ground along the Kanyakamuri coast is considered the richest in India.

Shrimp and sardines are being canned in the State. A factory at Tuticorin has a capacity of 5,000 eight-oz. cans a day. The products will be marketed in India and abroad.

Bombay

Full exploitation of the rich shrimp stocks off Bombay has been hampered by lack of shore facilities to handle the catch close to the fishing grounds. At times, shrimp have been taken only 50 miles from Bombay, but inadequate supplies of fresh water and space at Sasoon dock necessitated long journeys to Cochin for processing.

In its 1967 annual report, New India Fisheries, Ltd., says provision is being made to install a 10,000-gallon fresh-water underground tank at Sasoon dock. Also to be erected is a shed for peeling, deveining, and processing shrimp for home consumption and export.

Around a thousand vessels are fishing for shrimp in the Cochin area. A heavy toll is being taken of stocks, and catches have shown a downward trend.

Two more bases are planned by the company. These will allow it to fish all along India's west coast.

India (Contd.):

It is envisaged that gill-netting for large shoals of pomfret off the coast will be carried out in addition to fishing for shrimp. ("Fishing News International," March 1968.)

## Taiwan

FISHERIES ARE EXPANDING

In 1967, the Republic of China (Taiwan) landed a record 458,000 metric tons of fishery products--7.7 percent above 1965. The growth rate in fisheries production during 1967 did not match the phenomenal rate of 11.4 percent in 1966, yet it was as high as the Soviet production growth rate for 1967. The largest increases were in the high-seas fisheries because large tuna long-liners were added to the fleets. At the end of 1967, Taiwan had 260 long-liners.

Exports Soared

As a result, exports of frozen tuna (mostly to the U. S.) reached amounts undreamed of only a few years ago: in 1967, Taiwan exported 39,000 metric tons of frozen tuna worth US$13.8 million; total fishery exports exceeded US$20 million. Planned fishery exports for 1968 are $30 million. (Letter from T. P. Chen, Chief, Fisheries Division.)

In 1968, the first year of the 5-Year Plan, Taiwan plans to land 530,000 metric tons of aquatic animals and plants; by 1972, when the 5-Year Plan ends, a planned 800,000 tons of fishery products will be landed. During this 5-Year period, US$146.2 million will be invested in the construction of fishery vessels having a capacity of 122,000 gross tons. ("Taiwan Industrial Panorama," Jan. 1968.)

## Pakistan

USSR AIDS FISHERIES

In early March 1968, a team of Soviet experts arrived in Karachi to explore the possibilities of greater fisheries cooperation between the USSR and Pakistan. They visited fishing port and fish-processing plants, then went to Rawalpindi for talks with officials. Visits to various East Pakistan fishing centers were also scheduled. The mission is probably a followup to the Soviet Fisheries Minister's visit to Pakistan in late 1967 and commitments made then.

Suez Closing Hurts USSR

Soviet Indian Ocean fisheries have been severely hampered by the 1967 closure of the Suez Canal. It forces the Black Sea fishing fleet to go around the Cape of Good Hope, greatly prolonging trips and increasing production costs. The Soviets tried to partially offset this disadvantage: they began fishing for shrimp off West Africa in early 1968. Shrimp is important to the USSR as a dollar earner.

Other Indian Ocean fisheries are hurt, and it is conceivable that the Soviets are trying to secure a major fishing base in one of the nearby coastal states.

## Malaysia

SHRIMP INDUSTRY OF SABAH

In 1967, trawlers of the State of Sabah, Malaysia, landed more than 3,100 metric tons of shrimp: 2,900 tons in Sandakan, the balance in Labuan and Tawau. There are 2 freezing plants in Sandakan and 1 in Labuan.

Sabah's exports of frozen shrimp were about 1,500 tons worth M$6.6 million (US$2.2 million). This was about 38 percent more than the production and value in 1966.

In 1966, Sabah exported 1,085 tons of frozen shrimp worth M$4.8 million (US$1.6 million).

Most of the exported shrimp goes to the U. S. as large frozen blocks for institutional (not consumer) use. (U. S. Consulate, Kuching, Feb. 26, 1968.)

# CARIBBEAN

## More Freezer Trawlers Active in Shrimp Fishery

Since 1966, over 70 shrimp trawlers in the Gulf of Mexico and the Caribbean Sea have been equipped with freezers. The primary advantages gained have been longer fishing time, increased range, and freedom from land-based processing stations. Government officials, processors, and fishermen's representatives from countries in Central America and northern South America have voiced concern over the increase of foreign (mainly U. S.) freezer vessels. They view them as a threat to their established shore-based operations; they fear the trend may harm their own industries.

### A Beginning in 1961

Freezer vessels have operated in the Caribbean for several years. One vessel operated from Puerto Rico in 1961, but it returned to the U. S. in 1963 because the freezer unit did not work properly. According to industry sources, the big turn came after 1965, when Westinghouse developed a dependable freezer unit for small trawlers. The unit received wide acceptance in 1966. By summer 1967, over 50 vessels had freezers in the Gulf, and 20 in the Caribbean. Of the 20, 16 were based in Trinidad, and 2 each in Surinam and Puerto Rico. All 20 fished along the northern coast of South America.

### Freezer Trawlers Well Suited

The freezer trawlers have proved well suited to the fishery along northern South America. Great distances must be covered to fish the Amazon grounds, and the vessels have proved their worth. For instance, four larger vessels built in 1967 have been able to operate from Trinidad to as far south as Recife, Brazil; they remain independent of a base station for 3 months. The vessels have proved so successful that reports from Trinidad indicate all ice vessels operating from there are to be retired or be converted to freezer vessels this year. Gulf-based vessels already have fished off Guianas and returned to Florida with their catch. No doubt others will follow this winter when fishing drops off in the Gulf of Mexico.

### What Effects?

The result of greatly increased activity by freezer trawlers is not certain. If past experience is a guide, the following implications may be drawn: As the number of freezer vessels increases, the importance of land stations will diminish. Governments of countries maintaining land stations (particularly foreign-owned) can be expected to become more accommodating in order to retain the stations. But, also, there will be concern by governments that see the livelihood of their fishermen and their income from export taxes threatened by distant-water fishermen. (U.S. Embassies in Latin America, and other sources.)

# AFRICA

## Commercial Shrimping on West African Coast Grows

The shrimp fishery is developing in many parts of the world. Known fishing grounds are exploited more intensively each year; new ones are being discovered and their exploitation frequently is undertaken at a rapid rate.

Until recent years, the west coast of Africa, from Senegal to Angola, was not included in this development. But several species of shrimp were known to be there. Native fisheries were carried out in the lagoons or near the coast (pots, nets, traps); and trawl fisheries for finfish, until recent years, caught shrimp occasionally.

Began In 1963

It was not until 1963 that the first exploratory fishing dedicated wholly or in large part to shrimp began. Some was conducted by official research organizations, some by private vessels. Results were favorable. Since 1965, a commercial fishery for shrimp has been developing in tropical Africa.

## Mozambique

SHRIMP FISHING FIRM REORGANIZES

The general manager of the newly nationalized Portuguese firm in Mozambique--INOS (Industria de Peixe N. S. de Fatima)--says it will carry out an 8-boat expansion of its northern shrimp trawling fleet. Also, it is converting all its trawlers for packing and freezing at sea. The present supply base for trawling fleet at Antonio Enes will be eliminated. Operations in the north are to be concentrated at Porto Amelia. Trawling with 4 boats for deep-sea shrimp will continue out of Lourenco Marques.

To expand its shrimp trawling fleet, INOS is relying on U. S. technicians and boat designs.

INOS views the U. S. as its main market for frozen shrimp. It hopes that with an enlarged fleet of 15 boats at Porto Amelia, and increased shrimp landings there, it can persuade U. S. shipping lines (Moore McCormack and Farrell) to stop at Porto Amelia for shrimp cargoes.

Basic Reorganization

INOS has had continuing financial difficulties and personnel changeover this year. Its main hopes for becoming profitable rest on a reorganization of its packing and freezing methods. Of its 11 shrimp trawlers, 7 operate out of Porto Amelia and 4 out of Lourenco Marques. All 11 have been or are being equipped for packing, blast-freezing, and storing shrimp on board. These vessels will be able to operate for 25 days at sea and then deliver their shrimp ready processed to the INOS cold-storage facilities at Porto Amelia or Lourenco Marques.

INOS hopes the new system will produce higher grade packed shrimp and fewer losses from breakage. Lower grade and greater breakage occur when shrimp are stored in ice at sea, unloaded into trucks at Porto Amelia, and finally packed in the cold-storage warehouse some distance away.

U. S. Designs and Techniques

INOS is relying considerably in its reorganization plans on the experience of the U. S. Gulf of Mexico shrimp trawling industry. A designer from Rockport, Tex., has been in Lourenco Marques to advise on the design of the 8 shrimp trawlers. The designs will be prepared by a Rockport firm and be the Gulf Coast type modified for local conditions.

To Build Vessels Locally

Nationalized INOS must have these vessels built on Portuguese territory. It probably would prefer it anyway for public relations purposes.

U. S. Senior Skipper

INOS has hired a U. S. trawler captain of Portuguese descent as senior skipper of its trawling fleet at Porto Amelia. He helped develop shrimp fishing in Kuwait waters.

Mozambique (Contd.):

Deep-Sea Shrimp Trawling in South

The 4 trawlers based in Lourenco Marques are now fishing for deep-sea shrimp out along the 280- to 300-fathom line. Still in experimental stage, the fishery appears promising. But INOS will restrict fleet to the 4 for the time being. When the 8 Rockport-type vessels are built, they will operate from Porto Amelia.

## Libya

POLAND AIDS FISHERIES

Almost 2 years ago Poland announced that she would extend aid to Libyan fisheries. In late November 1967, the Libyan Undersecretary in the Ministry of Industries (Abdalaziz Kamaal) left for Poland to sign the contract to buy 33 fishing boats from the Polish firm CENTROMOR. The first of the 33 vessels departed Gdynia for Libya in mid-March 1968. Named "Al Muktashef," the vessel is 90.2 feet long, has a crew of 24, and will be used for scientific research, probably in the Mediterranean. Fishery experts from the Polish fishery firm DALMOR, in Gdynia, will be sent to Libya to train local fishermen in use of new vessels and fishing techniques.

Bulgarian Interest

This is not the first time Soviet Bloc countries have shown interest in Libyan fisheries. In 1963, a directive of the Bulgarian Communist Party mentioned the "expansion of Bulgaria into Mediterranean fishing." This never occurred, as far as is known.

The Libyan order for 33 fishing vessels consists of: 2 training and fishery research vessels (90 feet, steel); 2 trawlers (66.6 feet, wooden); 18 line and net fishing boats (40.3 feet, wooden); 10 line and net fishing boats (small, wooden); 1 patrol and fishery inspection vessel.

# MID EAST

## Kuwait

GULF FISHERIES CO. LEADS REGION IN SHRIMP FISHING

The Gulf Fisheries Co., Ltd., of Kuwait, the leading shrimp fishing firm in the Middle East, continues to diversify its interests. It has made several international investments in fishing, food processing, light manufacturing, and oil exploration in the Middle East, Africa, and the Far East. The firm's partners are Shaikh Sabah Al-Ahmad, Kuwait's foreign minister, Al-Rashed, a businessman, and Dr. Khalil Mahmoud, the general manager. Al-Rashed is not connected with the nonfishing activities.

Its Assets

Gulf Fisheries has assets (fleet and plant) of US$13 million; capitalization of US$2.9 million; an estimated US$6 million in reserves; 1,600 employes in season, 900 out of season; 61 ships, including 3 motherships and 2 combination stern trawler-motherships. Fiscal 1967 sales were US$14 million.

Delivery of 40-50 more vessels is expected during 1968-69. Many of these will be built in Poland.

Gulf Fisheries is represented in the U. S. by Crest Importing, San Diego, Calif., and International Fisheries, New York City.

Farflung Interests

The company owns fishing concessions in the waters of Iran, Somalia, Nigeria, and Indonesia. Forty-three of its vessels are in the Persian Gulf, but the high royalty paid the Iranian Government may cause the fleet to be shifted elsewhere.

Gulf has begun fishing for tuna off Somalia under the name of Somali-American Fishing Co. It has a cannery in Alula. Four vessels are operating off Nigeria; their catches have been poor. In Dahoman waters, 3 vessels are fishing with exclusive rights to shrimp, lobster, and all other crustaceans. Small catches and Dahomey's political instability are causing Gulf to lose interest there. Late in 1967, 21 vessels started fishing near Indonesia.

The company's interests will probably be incorporated under the name of Gulf International (estimated 1968 sales: US$50 million). (U. S. Embassy, Kuwait, Mar. 7, 1968.)

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INDEX (CONTINUED)



CAN FISH LEARN TO AVOID FISHERMEN?

Can fish learn that it is dangerous to get in the path of a trawl or to get too interested in a hook? Mr. J. H. S. Blaxter of the Marine Laboratory, Aberdeen, has researched the ability of fish to learn by experience.

Fish learn by association. In a tank, they will learn to associate a stimulus in the form of a noise, taste or temperature change with "feeding time". Thus stimulated, they will learn to go where food has been given. One test involved swimming up a slight ramp. Soon the fish would swim up the ramp when stimulus was applied without food.

About 30 "stimulating" experiences are needed to establish a new behavior pattern that, once learned, can be retained up to 9 months.

It is not known how often fish may avoid commercial fishing gear. Salmon and trout, threatened repeatedly by the angler, can become difficult to catch, having learned success through each survival experience. Age brings experience, but it also brings greater size and swimming power--up to a point, when old age might diminish the powers of escape. Which is the operative factor?

Tank experiments may show whether this escape knowledge can be passed to other fish (an older fish leading others from danger). However, tank fish behavior may differ from that of ocean fish. Science hopes to find answers through research. ("World Fishing.")

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.


UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

# Fishery Motion Pictures

The Bureau of Commercial Fisheries plans, supervises production, and distributes educational motion pictures sponsored and financed by fishing industry organizations.

23 fishery motion pictures are distributed free upon request through 200 Government and private film libraries in the United States. A catalog listing these films may be obtained by writing Audio-Visual Services, Bureau of Commercial Fisheries, 1815 N. Ft. Myer Drive, Room 601, Arlington, Virginia 22209.

# COMMERCIAL FISHERIES Review

VOL. 30, NO. 6 JUNE 1968

COVER: Dried shark for sale in Pakistan. Shark meat is soaked in brine pits and sun dried. It is bought mostly by Asian countries. Pakistanis prefer fresh fish.
(Photo: FAO/W. Williams)

# COMMERCIAL FISHERIES
# *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

Fishermen's Memorial
Gloucester, Mass.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)
and Mary Andrews

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209. Telephone: Area Code 703 - 557-4246.

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# CONTENTS

Aircraft photo from 2, 500 feet in Jan. 1967 of thread herring schools off West Coast of Florida. Not unusual concentrations for this area. (Photo: Johnny A. Butler.)

# WORLD COOPERATION NEEDED TO REALIZE OCEAN'S POTENTIAL, BCF DIRECTOR SAYS

Scientists are developing remarkable technology to understand and exploit the riches of the oceans. But before the full potential of the oceans can be realized to benefit mankind, there must be increased international cooperation and understanding. This was the major theme of the talk by H. E. Crowther, BCF Director, to the Second FAO Technical Conference on Fishery Research Craft, held in Seattle, Washington, May 18-24.

Fig. 1 - H. E. Crowther.

The conference, cosponsored by FAO's Fisheries Division and BCF, was attended by 150 persons from 20 nations. Jan-Olof Traung, Chief of FAO's Fishing Boat section, coordinated the conference.

Crowther recounted the development of research vessels and pointed to other forms of progress becoming visible on the horizon. The first Food and Agriculture Organization (FAO) Conference on Research Vessels was held in Tokyo in September 1961. Thirty-four delegates from 12 nations exchanged information on design and operation of research vessels--particularly those required for fisheries research. The meeting, Crowther said, "represented the beginning of an unprecedented decade in the history of ocean sciences."

The 7 years since the Tokyo meeting were fat ones. Many nations began to investigate the oceans. More fisheries and oceanographic vessels were designed and built than in any period in history. In 1961, BCF had only one major, new, ocean-going research vessel: the "Albatross IV." Since then, it has added to its fleet the "David Starr Jordan," "Townsend Cromwell," "Miller Freeman," and "Oregon II." Other U.S. agencies have built 30 high-seas oceanographic research and survey vessels that contribute much to fishery development. These vessels can operate anywhere in the world. While the U.S. achievement is impressive--it has been duplicated by many maritime nations.

"Oceanographic Boom"

There has been an "oceanographic boom" in the past 10 years, BCF's Director said, a boom that benefited, at least financially, all sectors of ocean science.

The boom resulted partly from man's curiosity about the unknown and partly from dramatization and popularization of the science

Fig. 2 - David Starr Jordan.

Fig. 4 - Miller Freeman.

Fig. 3 - Townsend Cromwell.

Fig. 5 - Oregon II.

Newest Major Members of BCF Fleet.

by the news media. But it also resulted from need--the need growing out of "demands for protein to feed a rapidly expanding world population."

Need for Food From the Sea

World fisheries--including "truly high-seas operations"--have grown faster in the past 20 years than in any other period. In 1967, the ocean yielded close to 50 million metric tons of fish and shellfish. Today, fish represent the major source of animal protein for about half the world's population. However, the world population explosion demands ever-greater food production.

Changing Emphasis in Fisheries Research

The questions marine scientists ask today differ from those asked not so long ago, Crowther said. "We are passing from the general descriptive phase of ocean science into a period of specialization." The research requires many new types of platforms. Fishery research vessels must be adaptable to more uses. They must handle complex equipment--operate large nets used by the fishing industry--provide laboratory space and equipment for data storage and analysis--and communication facilities for ship-to-shore transmission of research data.

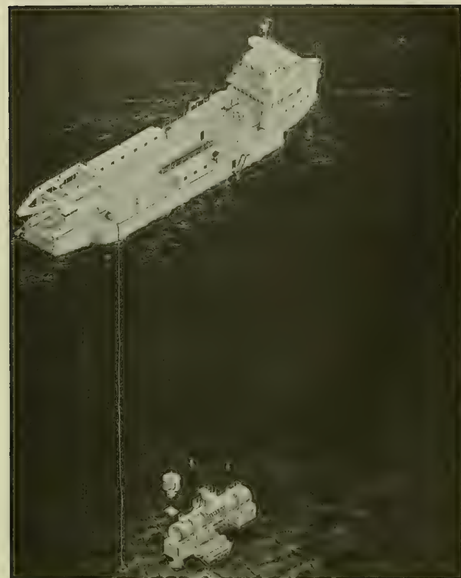
There is a "more applied tone" to marine research today. Scientists are seeking better means to find the ocean's living resources, to determine their numbers, and to extract them efficiently and profitably. They are studying means to predict variations in distribution and abundance of fish in time and space. They are developing procedures to achieve the largest catches in a period of time. They are developing better means of preserving fish and finding new uses for fish.

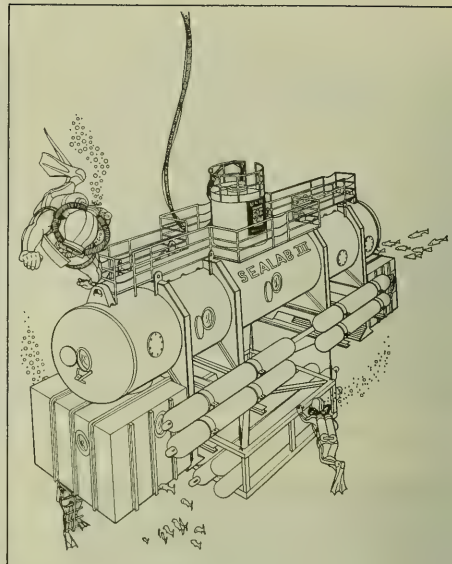
New Research Craft

New research craft have been designed to help the marine scientists. Many are conventional surface vessels for specific missions. But others add a new horizon to observation--the submersibles. Some can operate from surface waters to the greatest depths. In 1961, only a few existed. Now over 20 submersibles belonging to almost every major fishing nation operate in ocean depths between 1,000 and 15,000 feet. They investigate the behavior, distribution, and abundance of sea life--or they investigate the physical, chemical, or geological nature of the ocean and its seabed.

In the future, Crowther added, the research platform will include laboratory facilities built beneath the sea's surface. He outlined the Caribbean project slated for 1969 in which 4 scientists will live and work for 60 consecutive days on the ocean floor while isolated at 50 feet. The site is below the surface of Greater Lameshur Bay in the Virgin Islands National Park. The program involves the U. S. Navy, NASA, Interior Department, and the General Electric Co.

The program has two main purposes: (1) to conduct extensive marine science studies on the sea bottom--emphasizing the behavior and habit of marine animals and how they interact with their environment, and (2) to study the behavior of relatively isolated men under stress in an alien environment. The data can be useful to future underseas missions--and to extended-duration space missions.






Figs. 6 & 7 - Artist's concept of U. S. Navy Sealab III habitat--nonpropelled, seagoing craft with living compartment, diving station, observation room.

Cylindrical habitat is 12 ft. in diameter, 57 ft. long, with 2 rooms, each 8 ft. high and 12 ft. square, attached to bottom of habitat's hull.

Just above habitat is personnel transfer capsule used as pressurized elevator to ferry aquanauts to and from surface and ocean bottom. Both habitat and capsule have helium-oxygen atmosphere pressurized to equal surrounding sea-water pressure.

Starting October 1, 1968, for 60 days, habitat will be underwater base at depth of 430-450 feet off Southern California for 5 teams of 8 aquanauts. Each team will live 12 days under pressure, breathing an artificial atmosphere.

## From the Air

Observational platforms have been raised to the skies. Scientists are exploring surface phenomena and near-surface sea life using airplanes and satellites. The achievements of satellites indicate a "possible large payoff in fisheries." Orbiting resource satellites may provide the data scientists need to predict the most promising places for abundant and available resources. Weather satellites are providing data on ocean storms and sea heights needed to route vessels expeditiously to fishing grounds. In the future, part of the job of those concerned with the sea will be done remotely from monitoring or drifting buoys, or remotely controlled subsurface vehicles and facilities.

Today, oceanographers and meteorologists, through the Intergovernmental Oceanographic Commission and the World Meteorological Organization, are planning an Integrated Global Ocean Station System (IGOSS). This system involves the worldwide deployment of ocean buoys and other platforms, such as merchant and fishing vessels, to monitor continuously the ocean surface, subsurface,

and overlying atmosphere. Data will be telemetered automatically to land stations, there to be analyzed and distributed to users, including fishermen. Fishermen may benefit greatly from this system through better weather forecasts and predictions of abundance and distribution of fishery resources.

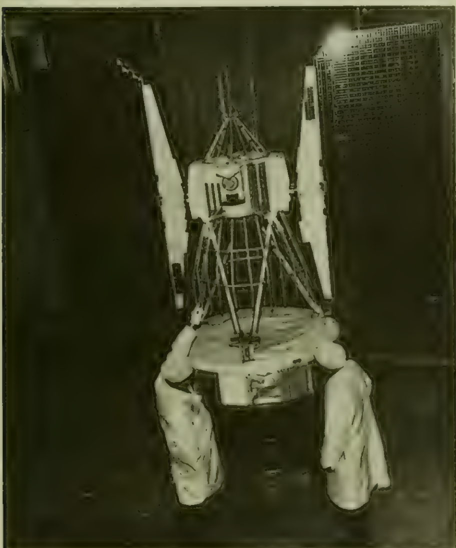


Fig. 8 - Spacecraft technicians check out NASA's 935-pound weather satellite Nimbus II. The large dark panels contain solar-cells that power complex electronic gear.

First NASA satellite to take and transmit directly to ground stations nighttime infrared photos of earth's cloud cover. (Photo: NASA)

## The Potential Harvest

The fishery potential of the seas ranges between 200 million and 1,000 million metric tons. These are theoretical potentials based on the ocean's productive capacity. They can be realized only by developing the technology to harvest them--and the understanding of how these resources react to their environment and to man's exploitation. To benefit

Fig. 9 - NOMAD (Navy Oceanographic Meteorological Automatic Device) buoy transmits data up to 2,000 miles--over standard 100 world-per-minute radioteletype circuits.
(Naval Oceanographic Office)

mankind, the information the scientists gain from the research vessel--and the technology developed to harvest the resources--must be passed on to the producer or processor.

## To Benefit Mankind

Crowther stressed the importance of international cooperation to benefit mankind. President Johnson recognized this need, he said, by his proposal to Congress in March 1968 for an International Decade of Ocean Exploration to start in 1970. The full use of new research platforms, harvesting techniques, and the means to manage ocean resources all may be part of the ocean decade.

BCF's Director defined the challenge to the FAO conferees: "History may truly mark the 1970s as the decade in which nations were first able to work and plan together effectively in development and use of ocean resources for the benefit of all mankind. . . . We cannot, however, gauge progress in ocean science solely on the basis of tools we employ. The part or role that they may play in solving world food needs and proper use of the ocean's living resources must be measured in terms of increased ocean yields."

# UNITED STATES

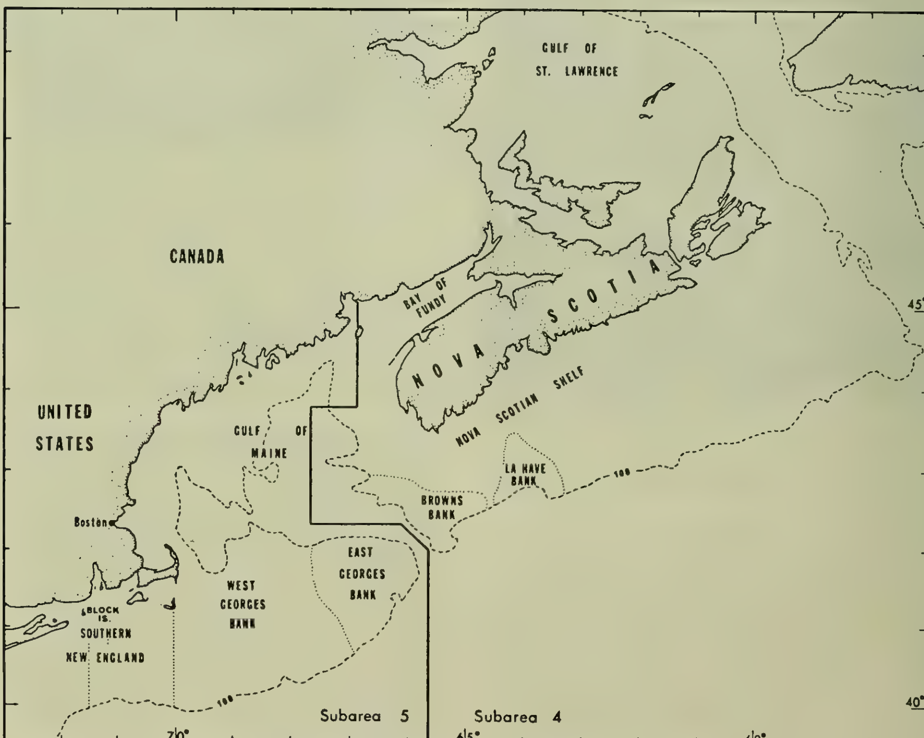
## 1967 New England Landings Show Ups and Downs

In 1967, New England fleets landed greater amounts of several important species and smaller amounts of others.

This information is contained in "Groundfish and Sea Scallops Fished by New England Fleets," a report by R. L. Schultz and F. A. Dreyer of the BCF Biological Laboratory at Woods Hole, Mass.

HADDOCK

U. S. haddock landings from Georges Bank in 1967 were 76 million pounds, round weight, or roughly 34 percent below the 116 million landed in 1966. Haddock abundance also declined: 8,600 pounds were landed per day fished in 1966 compared to 7,100 pounds in 1967. Lower scrod abundance accounted for this; it decreased from 6,600 pounds per day in 1966 to 4,200 pounds in 1967. Large-haddock abundance increased from 2,100 pounds per day in 1966 to 2,900 pounds in 1967.




Main United States fishing grounds in the Northwest Atlantic.

Age composition of Georges Bank haddock landings shows the shift of age group dominance during 1964-1967. Most noticeable in 1967, relative to other years, was the near-absence of 2- and 3-year-old fish (1964 and 1965 year classes). This was predicted from groundfish surveys in 1964 and 1965. Later surveys found the 1966 and 1967 year classes also very poor. With 4 successive small year classes on Georges Bank, below-average abundance and landings are expected to continue, at least through 1970. The year class failures had a more marked effect on seasonal fluctuations; large haddock were more abundant in the fourth quarter of 1967, but scrod were very low.

Noticeable in fourth-quarter age compositions are the significant numbers of one-year-olds. They were roughly 6 times more abundant than the 10-year average. This contradicts somewhat the research survey prediction of a poor 1966 year class, but faster growth may be responsible. The average length of one-year-olds in the fourth quarter (10-year average) is 36 centimeters. The 1966 year class averaged 39 centimeters in the fourth quarter. This increase in average size apparently is enough to put them into the selection range earlier than normally would occur. However, with the low abundance of scrod, the market demand would be higher. This would create a tendency to land smaller fish and make it more difficult to determine if a real change in growth has taken place.

Browns Bank

U. S. haddock landings from Browns Bank were 3.9 million pounds in 1967 compared to 1.8 million pounds in 1966. This increase resulted from increased scrod abundance. A trend of increasing abundance on Browns should continue until the 1962 and 1963 year classes are fully recruited. No samples were available for age compositions in 1967.

The fourth-quarter 1967 results do not indicate any change in abundance from 1966. The figures are based on less than 100,000 pounds and may not be indicative.

## YELLOWTAIL

Yellowtail landings in 1967 were 52 million pounds, almost 18 percent below 1966's 63 million pounds. Yellowtail abundance increased from 4,400 pounds per day in 1966 (Georges Bank) to 5,000 pounds per day in 1967. On Southern New England Grounds (SNE), it increased from 4,500 pounds per day in 1966 to 5,100 pounds in 1967.

Age compositions in 1967 (All Grounds) show the 2- and 3-year-olds in good abundance. This accounted for the increase in overall abundance in 1967. These 2 year classes appear somewhat large relative to other years and should contribute to increasing abundance and landings in 1968.

In fourth-quarter 1967, 2-year-olds were more numerous than usual in Georges Bank landings, but they were less so for Southern New England. This is largely the cause of the quarterly changes in landings-per-day estimates, as fishing effort in 1967 dropped below the levels of 1965 and 1966.

## COD

Cod landings by the U. S. from Georges Bank rose from 21.9 million pounds to 23.6 million pounds in 1967. Total U. S. landings increased about one fifth while landings per day dropped slightly.

Quarterly landings per day indicate some degree of increased catch rate in second-half 1967.

## REDFISH

Redfish landings by the U. S. from all New England grounds (Gulf of Maine and Georges Bank) were up about 7 million pounds in 1967. Landings per day remained about the same. Redfish landings from the Nova Scotian shelf dropped from 37 million pounds in 1966 to 14 million pounds in 1967. This decline was accompanied by about a 23 percent drop in landings per day. Redfish landings by all countries doubled in 1966 after declining in 1964 and 1965. Redfish landings by the U. S. from the Gulf of St. Lawrence in 1966 were 28 million pounds; in 1967, 34 million pounds. Landings per day increased from 46,000 pounds per day in 1966 to 55,000 in 1967.

## SILVER HAKE
(Food Fishery)

The U. S. silver hake food fishery, located principally in the Gulf of Maine and on the cultivator shoals of Georges Bank, declined 28 percent in landings in 1967. Labor disputes and large freezer holdings left over from 1966 were influential. Landings per

day in 1967 for Georges Bank increased slightly. However, abundance in the Gulf of Maine was down about half for the year, and about 80 percent in the fourth quarter.

INDUSTRIAL FISHERY

U. S. industrial landings from New England and Middle Atlantic waters in 1967 were 85 million pounds--about 16 percent below the 102 million landed in 1966. As red and silver hake landings remained about the same in 1966 and 1967, the decline was principally among other species.

Species compositions indicate red and silver hake percentage in the catch was slightly higher in 1967 than in 1966.

The landings-per-day estimate for industrial silver hake (SNE grounds) was 17,000 pounds in fourth-quarter 1967 compared to 8,400 pounds in 1966. This increase in abundance was accompanied by a million-pound increase in landings in fourth-quarter 1967 compared to 1966. Red hake abundance increased from 7,600 pounds per day in 1966 to 21,000 pounds in fourth-quarter 1967; in the latter period, landings of red hake increased 3 million pounds over the 1966 period. Middle Atlantic landings have declined in importance since the Amagansett plant on Long Island was closed.

SEA SCALLOPS

U. S. sea scallop landings for Georges Bank increased 750,000 pounds in 1967, but Middle Atlantic declined by about 50 percent. This lowered total landings by about 5 million pounds. Landings per day on Georges Bank declined slightly for the year--in contrast to the research-vessel index indicating an increase in abundance. Landings per day on the middle Atlantic grounds continue the declining trend evident since 1965.

## Contracts to be Awarded for Cleanup of Dead Alewives in L. Michigan

The Department of the Interior will award contracts for leasing 16 fishing boats to net dead alewives in Lake Michigan before they pollute beach waters.

Millions of alewives, small herringlike fish, died in summer 1967.

Plan Of Action

The lake is full of alewives. If the expected die-off occurs, the boats will take the dead fish to docking areas. The fish will be pumped into vehicles supplied by local communities and taken to disposal sites designated by the area authorities.

The alewife program resulted from a Federal-State enforcement conference held in Chicago, Ill., recently to help curb Lake Michigan pollution.

The Department of the Interior has agreed to contribute up to $250,000 for netting the dead fish. The 4 Lake Michigan States--Indiana, Michigan, Illinois and Wisconsin--have been asked to give up to $62,500 each.

Areas Protected

The skimming operation will protect daily 20 miles of shoreline in each State--a total of 80 miles. The areas to be protected include:

Illinois--Chicago area beachfront and waterfront.

Indiana--Gary, Michigan City, and Dunes State Park.

Wisconsin--Milwaukee and Racine-Kenoska areas.

Michigan--Benton Harbor-St. Joseph area and Grand Haven.

A fixed net will be set up off Saugatuck, Mich., as an experiment to determine if this can block dead alewives from being washed ashore.

## 1967 Great Lakes Production Is Greatest Since 1956

Total commercial fisheries production from the Great Lakes has increased for the third consecutive year. In 1967, U. S. and Canadian fishermen reported 124.8 million pounds, the largest harvest since 1956, and one of the ten highest since 1879, the earliest year of recorded data.

U. S. fishermen took 64.2 percent--80.1 million pounds, 12.3 million pounds over 1966.

The 1967 Canadian catch was 44.7 million pounds, about 3.1 million pounds less than 1966; the bulk of the decline was in Lake Erie. Despite this decline, the total catch was the fifth largest since 1879.

U. S. Alewife Fishery Larger

The increase in U. S. production can be attributed largely to intensification of the alewife fishery in Lake Michigan. The landing of almost 42 million pounds, 12 million pounds above 1966, was the fourth highest of any one species since 1879. Only catches of lake herring in Lake Erie in 1889, 1890, and 1918 were greater.

L. Michigan No. 1

The Lake Michigan catch was almost 57.2 million pounds, 14.4 million over 1966, and a record catch from the lake. Alewives were 73 percent of the catch; chub, 17 percent.

Lake Michigan displaced Lake Erie as the leading producer of fish; its landings exceeded Lake Erie's by about 7.8 million pounds. Excepting one year (1903), Lake Erie had always led the other lakes.

L. Erie Production

Lake Erie catches declined substantially--3.6 million pounds in Canadian waters, and 1.1 million pounds in U. S. waters. Ohio's 1967 catch fell to a record low.

Yellow perch presently accounts for more than half (52 percent) of total landings.

Smelt contributes substantially to the catch in Canadian waters.

The walleye once was a principal species. Average catch by U. S. and Canada from 1945 through 1957 was 5.3 million pounds. The catch has been decreasing steadily; in 1967, it was 1.2 million pounds, nearly 60 percent in Canada.

Lake Superior

In Lake Superior, U. S. fishermen took 454 thousand pounds less than in 1966; Canadian fishermen reported 705 thousand pounds more. Lake herring, formerly very prominent, continues to decline.

Lake Ontario

Both U. S. and Canadian fishermen reported increased catches in Lake Ontario--40 thousand and 179 thousand pounds, respectively. Today, white perch makes up bulk of the catch. It has increased steadily. Whitefish, formerly the dominant species, now is almost nonexistent.

Lake Huron

U. S. and Canadian fishermen in Lake Huron also reported decreased catches--558 thousand and 346 thousand pounds, respectively. The decrease is attributable primarily to smaller landings of chubs.

## Catfish Farmers Form Trade Group

Fish farmers of 8 states have formed a trade association: "Catfish Farmers of America." Meeting in Greenville, Miss., April 29-30, the farmers from Arkansas, Alabama, Louisiana, Oklahoma, Mississippi, Texas, Georgia, and Tennessee developed by-laws for the new association and set its goals: 1) to promote the "image" of pond-cultured catfish and to improve opportunities for selling them profitably; 2) give the farmers a common voice in dealing with Federal and state governments to achieve better relations; 3) to set up a trade journal that will provide good communication within the industry. In the beginning, "American Fishes Magazine" will be used.

Each farmer who joins the association will be assessed annually $1 per acre in fish production. The maximum per member is $500, the minimum $25.

## Blue Crab Deaths Increase in S. Carolina-Georgia Area

During spring 1966, 1967, and 1968, greater than normal numbers of dead and dying blue crabs were reported from the S. Carolina-Georgia area. Scientists from BCF's biological laboratory at Oxford, Maryland, are working with Robert Lunz, director of Bears Bluff Laboratories in S. Carolina, to determine the cause.

In mid-May, microscopic examinations of crab samples showed an infestation of an amebic parasite thought to be the cause of "grey crab disease."

BCF scientists will continue to work with state scientists on this problem.

## 1968 Import Quota for Tuna Canned in Brine

The quantity of tuna canned in brine that may be imported into the U. S. during 1968 at the 11-percent rate of duty is limited to 66,985,048 pounds. This is about 3,189,764 standard cases of 48 7-oz. cans. The limit is about 3.6 percent less than the 69,472,200 pounds (about 3,308,200 cases) in 1967; 2 percent over 1966's 65,662,200 pounds (about 3,126,771 cases); 1.4 percent greater than the 66,059,400 pounds (about 3,145,685 cases) in 1965; and 10 percent over the 60,911,870 pounds (about 2,900,565 cases) in 1964.

22% Duty Above Limit

Any imports of tuna canned in brine over the 1968 quota will be dutiable at 22 percent ad valorem under item 112.34, Tariff Schedules of the U. S.

The 1968 quota is based on the U. S. pack of canned tuna during the preceding calendar year (1967), as reported by the U. S. Fish and Wildlife Service.

First Quarter Imports

U. S. imports of tuna canned in brine during Jan. 1-Mar. 30, 1968, were 14,616,675 pounds (about 696,032 standard cases). These are preliminary data of the Bureau of Customs, U. S. Treasury Department.

## 2nd Boston Fish Expo Set for October

The second American Commercial Fish Exposition will be held in Boston, Mass., October 16-19, noon-6 p.m. The new location is the War Memorial Auditorium at the Prudential Center. Preparations for parking, registration, and hotel accommodations are well advanced.

Larger Affair

The first Expo last year was limited to the trade. It drew over 17,000 registrants. This year's is expected to be an altogether larger show.

Information may be obtained from: Second American Commercial Fish Exposition, Inc., 3 School Street, Boston, Mass. 02108, phone 742-0334.

GULF AND CARIBBEAN FISHERIES INSTITUTE ANNUAL MEETING

The 21st Annual Meeting of the Gulf and Caribbean Fisheries Institute will be held at the Hilton Plaza Hotel, Miami Beach, Fla., Nov. 17-21, 1968.

The Institute has issued a call for papers on the following topics: "industry problems related to labor, sanitation standards and inspection; culture of marine animals; international use of high seas resources; and Caribbean fisheries." Papers with a title and an abstract will be considered for inclusion on the program. These should be sent to the Executive Secretary, Gulf and Caribbean Fisheries Institute, 1 Rickenbacker Causeway, Miami, Fla. 33149. Presentation time for all papers is strictly limited to 20 minutes, followed by a discussion period. Manuscripts will be published in the Institute's annual "Proceedings" and may be longer than the version presented orally.

The Institute is a membership organization; the scientific membership fee is $5 per year, the industrial membership fee $25. Membership may be obtained prior to the meeting, or upon registration. Also, a registration fee of $15 is charged for attendance at the annual meeting.

The International Game Fish Conference will hold its 13th Annual Meeting, Nov. 22 and 23, immediately after the Institute's.

# OCEANOGRAPHY

## 'Uses of the Seas' Is Theme of 'American Assembly'

"In the last third of the 20th century, the sea offers new horizons to government policy and to private business, to the scientist and to the lawyer, to the sailor and to the shore-bound, to the miner and the fisherman, to the strategist and economist, to the old seafaring nations and to the newcomers among the 100-odd states which border the oceans." This statement introduces the final report of the 33rd American Assembly, which met at Arden House, Harriman, New York, May 2-5.

The American Assembly, an affiliate of Columbia University, was established by Dwight D. Eisenhower in 1950. It conducts nonpartisan meetings and publishes books illuminating important issues of U. S. policy.

The 33rd Assembly was attended by 72 persons from the fields of science, engineering, business, government, law, communications, and religion. They reached general agreement on a final report. Most of their recommendations appear below.

Peaceful Uses

In the peaceful uses of the sea during the next 10 years, the "primary interest will be in the harvest of food and in minerals." The Assembly recommends that in planning to exploit the seas high priority be given to living resources.

The yearly harvest of fish and shellfish is over 55 million tons. It can be quadrupled without exhausting fish stocks--if international conservation is practiced. Through fish protein concentrate (FPC) and other food products, the sea could contribute significantly to providing high-quality protein to a world population of 5 billion persons. Aquaculture can expand marine produce--especially shellfish of higher commercial quality.

Minerals

The most valuable minerals will continue to be oil and gas; already, over one sixth comes from offshore wells. The continental shelf and slope probably will provide the largest new reserves. "Within ten years all these reserves will probably be technologically, if not economically, exploitable."

Weather & Oceanic Forecasting

Improved knowledge of the interaction between atmosphere and sea offers the prospect of much better weather and oceanic forecasting. It offers too the possibilities of modifying weather. "Any unilateral action for major climate modification should be subject to international control," the Assembly suggests.

Decade of Ocean Exploration

The Assembly supports President Johnson's call for an International Decade of Ocean Exploration: It believes: "Given the expanding prospects at sea, it is urgent to take measures to accommodate competing uses, to promote conservation, to refine the laws, to negotiate the appropriate international agreements, and to create international machinery to assist in the scientific investigation of the seas and in orderly development of sea resources."

Military and peaceful uses can conflict. Also, civil uses can be incompatible; as, for example, mining and fishing in the same areas. Resolving such conflicts requires more urgent attention on national and international levels. "The ominous problem of pollution must be similarly attacked."

Law of the Seas

It is necessary to redefine the width of the territorial sea and of the continental shelf. A "new and certain law for the deep ocean floor" should be developed to forestall unilateral national action and "undesirable precedents."

The Assembly proposes that:

- The territorial sea should be as narrow as possible. It might be up to 12 miles, provided freedom of passage through all international straits is assured.
- The deep sea bed should not be subject to "national appropriation by claim of sovereignty."
- There should be early international agreement on new management of the deep sea bed to encourage exploration and exploitation.

• The legal concept of the continental shelf in the 1958 Geneva Convention should be redefined. It should eliminate as unworkable the clause giving coastal nations sovereign rights to mineral resources in adjacent areas beyond the 200 meter depth, wherever these resources can be exploited.

• The redefined shelf should be "narrow, not wide, preferably not beyond the 200 meter depth."

• Until revised, the U. S. should announce its intention not to claim permanent exclusive rights to natural resources of the sea bed beyond the 200 meter depth. The U. S. would go on issuing licenses to exploit adjacent areas beyond that depth. But this would be subject to the condition that it would transfer to an international body that might be established for the resources of the deep sea bed any licenses in areas subject to that body. The U. S. should urge other nations to do the same.

The U. S. should support the creation of international body within the United Nations responsible for the exploitation of nonliving resources in the deep sea floor. This body might:

--issue licenses and regulate agreed activities;

--collect an agreed share of revenues for international purposes, including aid to developing nations;

--refer disputes to international arbitration or adjudication;

--encourage research, exploration, and investment.

Living Resources

Concerning the seas' living resources, the Assembly is convinced that stronger regulatory machinery "is urgently required to avoid economic and physical wastes such as occur in current fishing practices." It should include "management of the harvesting and farming of such resources."

Coastal Zones

Concerning fishing in coastal zones, the U. S. should seek a new international agreement on territorial waters to hold the boundary for exclusive fishing rights as close as possible to coast lines. Incentives should be provided for coastal nations to limit their exclusive fishing rights to 12 miles.

Organization of U. S. Marine Policy

The Assembly recognizes several critical factors in U. S. Government organization for marine policy:

• An important first step toward adequate organization was Public Law 89-454. It created an interim National Council on Marine Resources and Engineering Development to implement and improve ocean policy. It set up a Presidential commission to make recommendations for the future.

• There are too many government agencies and their activities are too dispersed.

• Private investment must be encouraged, along with strengthening Government machinery.

• The importance of the international dimension in ocean affairs requires improved formulation of U. S. policy.

Goals Worth Achieving

The Assembly concludes: "The stakes at sea are high and a commensurate investment might be several times higher than the one half billion dollars which the federal oceans program now receives annually from the Congress.

"The Assembly believes that the growth of international cooperation on and in the seas will strengthen the world economy and build the peace. It is convinced that Americans should begin thinking about the oceans as a major concern, somewhere in the scale which includes outer space, urban problems, transportation, public health, foreign aid, and the world population explosion."

## Nautical Charts for Texas Intracoastal Waterway

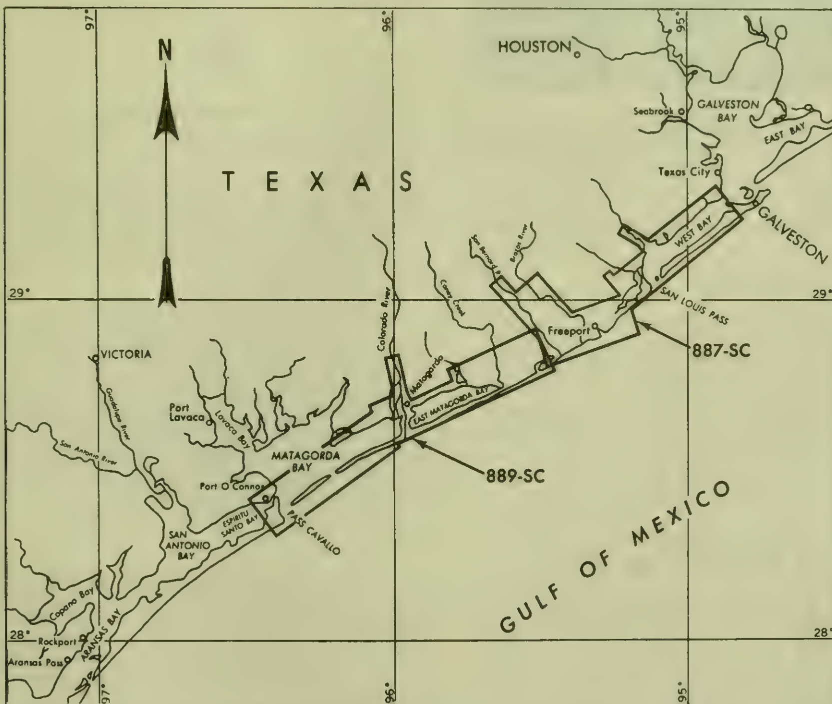
Two new small-craft nautical charts covering key sections of the Gulf Intracoastal Waterway in Texas have been published by the Coast and Geodetic Survey. The accordion-folded charts are part of a series designed to span the giant half-circle of the Gulf Coast. They bridge 2 of the Nation's busiest commercial and recreational boating areas, Galveston and Matagorda bays.

120 Miles Covered

When joined, the charts cover about 120 miles of the Gulf's Intracoastal Waterway for commercial shipping and recreational boating. The waterway was improved to a controlling depth of 12 feet. It carried more than $71\frac{1}{2}$ million tons of commerce by barge and small freighters in 1964. The traffic exceeds original estimates by 500 per cent--and is still expanding. The new charts (887-SC and 889-SC) include topographic features based on 1965 and 1967 aerial photography by the Coast and Geodetic Survey.

New information benefits the more than 223,000 recreational boaters registered by the state in 1967.

The charts were produced at the scale of 1:40,000. They may be purchased for $1.50 each from Coast and Geodetic Survey nautical chart agents, or from the Coast and Geodetic Survey (C44), Rockville, Md. 20852.




Area covered by two new small-craft nautical charts issued by the ESSA Coast and Geodetic Survey for the Intracoastal Waterway in Texas.

## 'Rainier' Is 14th Vessel in Coast & Geodetic Fleet

A 231-foot, 1,627-ton vessel--the "Rainier"--has become the 14th hydrographic and oceanographic survey vessel operated by the Coast and Geodetic Survey (CGS). GCS is part of the Environmental Science Services Administration (ESSA) of the U. S. Department of Commerce.

The Rainier is being equipped with the "latest electronic, depth recording, and positioning equipment." The vessel, constructed in Jacksonville, Fla., will chart U. S. coastal waters to help provide safe navigation for commercial shipping and recreational boating.

Seattle Home Port

The Rainier was expected to sail about June 4 on a one-month trip via the Panama Canal to her home port of Seattle, Wash. There she would join the "Fairweather," one of 2 sister ships (the other is "Mt. Mitchell") completed earlier at Jacksonville and now operational.

## ESSA Vessel to Study Circulatory Current Patterns

The nation's newest circulatory survey vessel, the "Ferrel," was christened and commissioned by ESSA June 4 near Jennings, La. The 133-foot, 300-ton, 16-man ship will be turned over to ESSA's Coast and Geodetic Survey (CGS) "to determine circulatory current patterns in the coastal and estuarial waters of the east and gulf coasts." She is the first vessel built in U. S. specifically for such work. She will operate with a 59-foot auxiliary buoy tender. Home port for Ferrel and tender is Norfolk, Va.

The Ferrel will be base ship for the TICUS (tidal and current survey) system developed by CGS. She will receive telemetered information from TICUS buoys, tend buoy systems, and transport equipment from site to site.

The Ferrel was named after Professor William Ferrel, a 19th century pioneer scientist. He contributed much to the knowledge of tidal phenomena.

The Ferrel cost $690,000. She will carry 15 buoys and 48 sensors. Her first assignment will be in Louisiana waters near New Orleans. She will continue an earlier survey to determine the circulatory pattern of currents in the Mississippi River-Gulf Outlet Canal, Chandeleur Sound, and Breton Sound.

## Investigate 1-Mile-Deep Gash in North Pacific Floor

U. S. oceanographers are investigating this month a mile-deep gash in the floor of the North Pacific. The gigantic chasm, which begins about 1,000 miles off north California, extends westward for thousands of miles. It may cross the Pacific.

On the ocean floor, between the chasm's eastern end and the California coast, is a range of cliffs and mile-high mountains. These range in width from 4 miles near north California to about 100 miles wide 1,000 miles to the west. The chasm begins here. It is an immense fracture in the ocean bed about 1 mile deep and tens of miles wide, 3 miles below the surface. The entire area is the Mendocino Scarp and Fracture Zone.

Purpose

The investigators are studying the origin of the scarp and fracture and delineating its features. The program calls for 20 dredge hauls and 12 sediment cores of the ocean bottom. Photographs of the seabed with underwater cameras are being taken at 20 different locations.

The investigation is being conducted from ESSA's USC&GSS "Oceanographer," a Seattle-based electronically equipped oceanographic survey vessel.

## Book Answers 100 Questions About the Oceans

A 120-page, $5\frac{1}{2}$x$8\frac{1}{2}$-inch book that answers 100 "Questions About the Oceans" has been issued by the National Oceanographic Data Center (NODC), which is managed by the Naval Oceanographic Office.

The questions include: "What is green scum?" "Why is the ocean salty?" "What is the hydrologic cycle?" "What causes the hydrogen sulfide concentration at the bottom of the Black Sea?" "What universities and colleges have oceanographic courses?" "Who hires oceanographers?" Many questions are illustrated, some humorously. Each answer contains a guide to further reading.

Brief & Clear Answers

The publication was written by Harold W. Dubach, NODC Deputy Director, and Robert W. Taber, (Acting) Director of NODC's Quality Control Division. They selected the questions from thousands about oceanography and answered each briefly and in language secondary school students can understand.

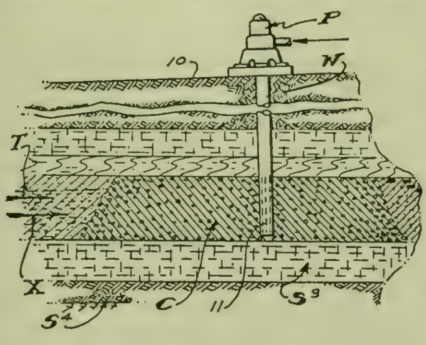
A paperback copy of "Questions About the Oceans" is available for $.55 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Correction: In May CFR, p. 9, caption under U. S. Navy's vessel "Kane" should have read: "USNS" not "USGS".

PUMPED-IN DAM TO PROTECT FRESH WATER

In coastal areas, when fresh water is pumped in large quantities from underground water-bearing formations, the pressure often becomes low enough in the aquifers that salt water from the ocean can leak in and contaminate the fresh.

Several ways of preventing this have been tried, but with limited success. One method, now in use in southern California, uses a second well in addition to the one through which the fresh water is being extracted. Fresh water is pumped down this second well both to maintain pressure in the aquifer and to keep a current flowing against the incoming salt water. This is obviously less than ideal, however, since the whole idea is conservation of limited fresh water.




Now a pair of California inventors have patented an idea which may show promise: It consists of pumping a dam down a well to block off the contamination. A series of holes is drilled in a line between the fresh water supply and the incoming salt water. A slurry of clay of other non-water-soluble material is pumped down the first hole, while fresh water is removed from the second in conventional fashion. Then the process is shifted so that slurry goes down the second hole and fresh water comes up the third, and so on until a wall has been built blocking the aquifer off from the salt water.

The idea would require a lot of solid material, admits the inventors, but the drilling mud used in oil wells provides an obvious source. Its use would also relieve the oilmen of the cost of disposing of it. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966 by Science Service, Inc.)

## Foreign Fishing Off U. S. in April

OFF ALASKA

Japanese: Between 130 and 135 Japanese vessels fished off Alaska through April--20-25 more than in late March. The increase was due to arrival of another factoryship in eastern Bering Sea, more reefers and cargo vessels, and a slight increase in independent trawlers.

The factory trawlers in Pacific ocean perch fishery in Gulf of Alaska increased from 6 to 7 in early April and remained at 7 through month. During first-half April, the 7 were scattered off southeast Alaska, on Fairweather Ground, and on Yakutat grounds in eastern Gulf. About mid-month, 5 vessels shifted to Middleton Island grounds in Central Gulf; in late April, the same 5 shifted farther west in central Gulf to Albatross Bank and Chirikof Island area. Between 7 and 10 independent factory trawlers (500 to 3,500 gross tons) fished for perch along 100-fathom curve in eastern and central Bering Sea through April. The primary area was along curve from just south to just northwest of Pribilofs. The factoryship "Chichibu Maru" replaced the factoryship "Meisei Maru No. 2" in central Bering Sea in early April and assumed the latter's 7 trawlers. This fleet fished along 100-fathom curve northwest of Pribilofs through April, presumably for ocean perch.

The factoryship fleets engaged in minced fish meat and fish meal production in eastern Bering increased from 3 to 4 in early April when the fourth, with 16 trawlers, arrived. All 4 fleets concentrated on Alaska pollock grounds north of Fox Islands in eastern Aleutians during most of April; but at month's end, 3 fleets had moved to Continental Shelf north of Unimak Island in eastern Bering.

The two crab factoryships, accompanied by 16 vessels, remained on Continental Shelf north of Alaska Peninsula in eastern Bering. In late April, however, 4 tangle-net setters were reported near Pribilofs. In 1965 and 1966, one fleet and, in 1967, both fleets shifted to Pribilofs in late May and early June. The 4 net-setters in Pribilof area in April meant fishery again will be shifted there--but earlier than previously. This early movement presumably is due to fact that Japanese crab fleets, like Soviet, are catching predominately tanner rather than king crab on Continental Shelf north of Alaska Peninsula. Unlike Soviet, however, the Japanese fleets, besides fishing tangle-net gear, also are fishing pots, which are more selective for tanner crab. One fleet reportedly was using 4,000 tanner crab pots, 400 larger pots designed for king crab, and 600 medium dual-purpose pots--and carrying a full complement of tangle-net gear. The other fleet was using principally tangle-net gear, but it also was working 500 tanner crab pots and 200 larger pots for king crab. In early April, the first fleet's average daily catch was reported between 20 and 60 metric tons, 90 percent tanner. The other's production in early April was 3,900 cases of king and 1,500 cases of tanner. Although only 28 percent of cases packed by this fleet consists of tanner crab meat, about an equal number of king and tanner crab was caught. Because tanner are smaller, more are needed to produce a case.

During April, at least 10 long-liners fishing for sablefish were active off Alaska--all in eastern Gulf of Alaska. The number varied from 3 to 6. Observations of one long-liner indicated it may be using diver gill nets, fished just off ocean floor, rather than long-line gear. This gear was used by Japanese in Gulf of Alaska in 1963; the catches were almost entirely sablefish.

Two long-liners and one small trawler, rigged with gear not normal for them, were observed in Bering Sea in April. One vessel was on Bristol Bay "flats" south of Togiak Bay; the other two in central Bering northwest of Pribilofs. It is believed they are fishing gill nets for herring. However, the small trawler in the central Bering had a variety of gear, including glass floats and crab pots; it was equipped with table and roller on stern. This vessel possibly was engaged in exploration.

Soviet: The decline in vessels off Alaska, which began in Feb. 1968, ended in April. The number remained over 70 through month, with considerable weekly fluctuations.

The Pacific ocean perch fishery (6 vessels) was confined to Aleutians through April. By mid-April, when flounder fishery in eastern Bering had disbanded, this fleet increased to about 12 medium trawlers supported by 2 refrigerated carriers. It continued at that level through month.

The shrimp fishery on Portlock Bank just east of Afognak Island in central Gulf of Alaska continued at increased level through April. The two "Zakharov"-class canning factoryships remained, as in March 1968; but in early April, medium freezer trawlers increased from 15 to about 20.

Flounder fishing in eastern Bering, which began to decline in March, was discontinued in mid-April.

In early April, trawlers north of eastern Aleutians switched emphasis from deep-water trawling for sablefish and turbot to trawling along Continental Shelf edge for groundfish; these consisted mostly of pollock, flounders, perch, gray cod, and sablefish. By mid-month, fishery was extended along Continental Shelf edge into central Bering; and, operating between Unimak Pass to well northwest of Pribilofs, were over 20 trawlers and 1 to 3 refrigerators. By end of April, fleet was concentrated in 2 areas: north of eastern Aleutians near Unimak Pass (5 vessels) and along 100-fathom curve in central Bering northwest of Pribilofs.

Two Zakharov-class canning factoryships, accompanied by 7 net-setting trawlers, were active in king crab fishery on Continental Shelf in eastern Bering through April. As previously, the fishermen were using only tangle nets; however, this year their catches consist also of tanner crab. King crab catches prevailed in previous years; this year, the proportion of tanner was at times as high as 50-95 percent of total crab catch.

OFF PACIFIC NORTHWEST

Japanese: Two vessels, one a stern-trawler and the other a support vessel, operated off U. S. Pacific Northwest during April. The stern-trawler concentrated on ocean perch and appeared doing well. A single haul off Oregon appeared to be about 14,000 pounds of ocean perch, the largest single haul seen taken by this vessel.

Soviet: 54 different fishing and support vessels were sighted. In March 1968, only about 20 such vessels were sighted off Washington and Oregon. The number increased rapidly each week during April until it reached peak of 39 in fourth week (see table). This indicated beginning of Pacific hake season.

By type, the 54 were: 12 stern factory and freezer trawlers; 29 medium trawlers; 10 processing and support vessels; and 3 research vessels. The mix is similar to previous years with one exception: a few more stern trawlers in 1968.

Most fishing was off Washington until about mid-April, when entire fleet concentrated off Oregon (see table).

Catches in first part of April off Oregon and Washington appeared mostly Pacific ocean perch and other rockfish. During latter part, when hake began running off Oregon, catches up to 10,000 pounds per drag were observed.

Soviet Fishing Vessels Sighted Off U. S. Pacific Northwest in April 1968

| Week Ending | Area | Type of Vessel | | | | | |
|---|---|---|---|---|---|---|---|
| | | Medium Side Trawlers | Stern Factory Trawlers | Support Vessels | Research Vessels | Tugs | Total |
| Apr. 4 | Wash. | 10 | - | 3 | - | 1 | 14 |
| | Oregon | 2 | 3 | - | - | - | 5 |
| | Total | 12 | 3 | 3 | - | 1 | 19 |
| Apr. 11 | Wash. | 7 | 1 | 6 | 1 | 1 | 16 |
| | Oregon | 5 | 4 | 0 | 0 | 0 | 9 |
| | Total | 12 | 5 | 6 | 1 | 1 | 25 |
| Apr. 18 | Wash. | - | - | - | - | - | - |
| | Oregon | 18 | 8 | 5 | 2 | 1 | 34 |
| | Total | 18 | 8 | 5 | 2 | 1 | 34 |
| Apr. 25 | Wash. | - | - | - | - | - | - |
| | Oregon | 18 | 10 | 8 | 1 | 2 | 39 |
| | Total | 18 | 10 | 8 | 1 | 2 | 39 |

Research vessels of Pacific Institute for Fisheries and Oceanography (3 medium trawlers) were sighted. At least 2 probably were searching for fish concentrations to aid the fleets.

OFF CALIFORNIA

Soviet: During 2 surveillance flights, 6 vessels were sighted on April 3, about 16

miles off Farralon Islands; 13 vessels on April 19 off northern California. Estimated number of vessels off California during April was about one dozen. Most were stern factory trawlers.

Research Vessel Takes Supplies At Los Angeles: On April 18, the research vessel "Druzhnii" of Soviet Pacific Institute for Fisheries and Oceanography received permission to enter Los Angeles harbor (see fig. 1) to obtain 100 tons of drinking water and 140 tons of diesel oil. The vessel had departed Vladivostok on Feb. 25 and was headed for Central Equatorial Pacific to conduct oceanographic research.

IN GULF OF MEXICO AND OFF SOUTH ATLANTIC

No foreign vessels were sighted fishing off U. S. Atlantic coast south of Cape Hatteras (including off Florida) or off U. S. Gulf of Mexico coast.

IN NORTH ATLANTIC

An estimated 240 vessels--Soviet, Polish, East German, and Japanese--were sighted in North Atlantic off U. S. coast. This was 70 over the March 1968 number. Soviet vessels were most numerous; judging from weekly surveillance, Soviet fleet averaged an estimated 120.

Fig. 1 - On April 18, 1968, Soviet research vessel "Druzhnii" ("The Friendly One") enters Port of Los Angeles (San Pedro Bay) for fuel and provisions. (Photo: Putnam, Calif. State Fish and Game Commission.)

Aid to Soviet Fishermen: On April 26, 2 stern factory trawlers were granted permission to enter Drakes Bay. The "Revolutsioner" reported to U. S. Coast Guard that 2 crew members were injured and asked permission to enter U. S. territorial waters to rendezvous with "Tikhvin", which had a physician aboard. Later in day, the emergency medical evacuation of a seaman was requested. Diagnosis: compound fracture of nose.

In all, 188 individual Soviet vessels were sighted and identified; this compares with 125 in March 1968.

Thirty-seven Polish vessels, 5 East German side trawlers, and 2 Japanese stern trawlers also were sighted.

Widespread and frequent shifting of foreign fleets between Georges Bank and off U. S. mid-Atlantic necessitated coordination of

flights with First, Third, and Fifth Coast Guard Districts.

IN NORTHWEST ATLANTIC

Soviet: Early in April, about 30 Soviet vessels were dispersed along Continental Shelf from Block Island (R. I.) to Nantucket Island (Mass.). By mid-month, number declined briefly when fishing shifted to waters off New York and New Jersey. Later, about 70 returned and fished south of Nantucket and on south-west slopes of Georges Bank. The limited catches visible on deck appeared mostly herring, with some whiting and red hake.

OFF MID-ATLANTIC

Soviet: Through April, 100 or more vessels (mostly medium trawlers and support ships) fished primarily off New York and New Jersey and intermittently off Virginia Capes.

Early in month, about 75 vessels were 40-60 miles south of Moriches Inlet, L. I. Heavy-to-moderate catches observed were herring. By mid-month, an estimated 100 vessels were concentrated about 60 miles south of the Inlet. (See fig. 2.) Limited catches were primarily herring, but several stern trawlers appeared taking red hake. During first-half April, 25 to 30 vessels were off Virginia.

In last 10 days of April, frequent reports from U. S. fishermen at New York and New Bedford, Mass., indicated 50 to 60 vessels taking scup near Hudson Canyon south of Long Island. U. S. fishermen also reported taking in their trawl nets large amounts of scup and herring heads discarded by Soviet vessels processing the fish.

Polish: Early in April, about 20 vessels were 35 miles east of Barnegat Lightship off New Jersey. By mid-month, 30 vessels fished south of Long Island. Moderate catches of herring were seen.

East German: Four vessels arrived off southern New England and New York during second half of April. They were fishing for herring 17 to 23 miles south of Shinnecock Inlet (L. I.) and off Block Island (R. I.).

Japanese: Late in April, 2 stern trawlers were sighted near Hudson Canyon. The area has good whiting and red hake resources. Japanese sources report one trawler has taken about 200 tons, primarily butterfish, mixed with squid and other species. On April 30, one vessel was sighted 70 miles south of Block Island (R. I.). No catches were observed.

Fig. 2 - Soviet processing factoryship "Chernomorskaia Slava," built in W. Germany, receives catches from medium side trawler (SRT class) in Moriches Inlet loading and unloading zone. This is off Long Island, N.Y., and was established by 1967 U.S.-USSR Mid-Atlantic Fisheries Agreement. (Photo: USCG cutter "Tamaroa")

# STATES

## California

FIRST BASKING SHARK LIVER SENT TO JAPAN

The Japanese vessel "Montana Maru" carried the first shipment of basking shark liver from California to Japan for processing, reported BCF La Jolla in April.

The shipment consisted of 139 drums totaling 57,465 pounds of liver taken from about 60 sharks. Most sharks were taken near Santa Barbara by 5 vessels in 3 days. Two more vessels have entered the fishery; several more have shown interest.

The fleet was expected to move north to Monterey, where 1,000-1,500 sharks were seen repeatedly by an airplane pilot.

* * *

EDA HELPS CREATE FISHERY FACILITIES AT CRESCENT CITY

Two grants totaling $385,000 to help develop a waterfront industrial park--and create 345 jobs--at Crescent City, Calif., were approved by the Economic Development Administration (EDA).

The Crescent City Harbor District will develop a 4-acre park costing $594,000. The project includes building wharves, ice plant, and 2 seafood processing plants. The Harbor District is matching EDA's $297,000 grant.

A. Paladini, Inc., Del Norte Ice & Cold Storage Co., and Eureka Fisheries, Inc., will operate the plants under long-term leases. Paladini will provide 133 new jobs, Eureka 208, and Del Norte 4.

Sewer System

EDA also is granting $88,000 to Crescent City, which will match it, to help expand its sewer system to serve the industrial park. The system will serve the harbor area and adjacent parts of Del Norte County.

Development of the waterfront industrial park is part of city and county long-range efforts to strengthen the fishing industry and replace jobs lost by the closing of 2 lumber plants.

## Alaska

STATE POLLUTION LAWS STRENGTHENED

BCF Juneau reports that Gov. Walter J. Hickel of Alaska signed legislation in April prohibiting pollution of State waters by petroleum, acid, coal, or oil tar, lamp black, analine, and bitumine.

The Act provides, on conviction, fines of $500 to $2,500 and imprisonment of 30 days to 1 year. Violators also may be held liable for civil damages of $5,000 to $100,000. If a vessel is involved, it can be seized without warrant and held as security for payment of civil damages.

* * *

SALMON CANNERY PLANS TO REOPEN

Nakat Packing Corp., an A & P subsidiary, plans to operate its Sunny Point salmon cannery at Ketchikan for the first time since 1952. This will make 3 major canneries operating there this year.

The decision reflects predictions of an excellent salmon year in the southern part of Southeastern Alaska.

* * *

FERRIES TO SERVE PRIME FRESH SEAFOODS

Alaska's finest seafoods will be delivered fresh to each ferry arriving at Petersburg. The suppliers will be: Alaska Glacier, shrimp and Dungeness crab; PFI, king crab; Petersburg Cold Storage, halibut, salmon, and sablefish (black cod). In all, 2,000 pounds will be provided to the Southeastern Alaska ferries each week.

This will be the first constant supply to the ferries. The fresh seafoods will be in insulated containers.

* * *

KODIAK WATER SHORTAGE EXPECTED

The recent expansion of shrimp production has made Kodiak officials uneasy about the municipal water supply. If present plans are fulfilled, there will be 20 to 24 shrimp peeling machines in operation by the end of 1968. This is more than a 100 percent increase in machines that use much water.

Water Needs Increasing

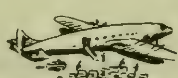
During the past year, Kodiak tripled its water supply. At present, it is enlarging its reservoir capacity. It was hoped the completed projects and those being built would meet industry needs for the next 3-5 years. However, fishery developments, especially in the shrimp industry, have created new water demands that must be met this year. At peak processing periods, Kodiak uses as much water as metropolitan Anchorage, a city 10 times larger.

## Hawaii

SEEKS AIR LINK WITH ALASKA

The Hawaiian Legislature has approved a resolution asking for direct air service between Anchorage, Alaska, and Honolulu. The resolution was directed to the Civil Aeronautics Board in Washington, D. C.

The legislature said Hawaii produces cattle and other commodities that are shipped to Alaska in large quantities. Alaska has large quantities of seafood that can be shipped to Hawaii. Also, the route would be a potential stimulant to the movement of commerce and people.

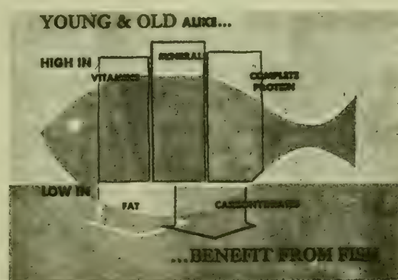


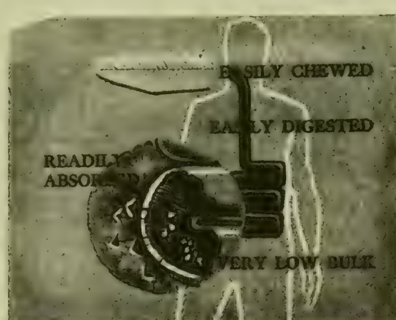
## Florida

BANS SALES OF
CERTAIN PUBLIC LANDS

Florida has banned any more sales of public land in Boca Ciega Bay, Apalachicola Bay, Charlotte Harbor, Featherbed Bank, and Banana River. It has ordered a master plan for the "preservation and utilization of state submerged lands." An interagency committee was set up to develop a plan that would designate areas in a natural state to be set aside in perpetuity.

Research by BCF's Biological Laboratory in St. Petersburg Beach brought to public attention the effect of dredging and filling on the rich marine life of these areas.



# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## BCF's New Lobster Trap May Open Offshore Fishery

A new steel pot (trap) that can be used in offshore, deep-water, lobstering may lead to a new fishery for Gloucester, Mass., and other coastal fishing centers. It was developed by BCF's Exploratory Fishing and Gear Research Base in Gloucester. The new pot has excited fishermen.

At present, lobsters are caught inshore using wooden slat boxes with net openings--and offshore with trawls. A wooden box cannot be used in deep water because it floats. And the trawl often injures lobsters when catching them and again when it is raised to a vessel's deck. Massachusetts law forbids landing dead lobsters.

The wooden boxes are strung in strings of 4 to 6 on the sea bottom with a buoyed line. Most inshore lobstermen fish within 1-1½ miles off shore with lines 75-120 feet long. The average take is one pound per pot during the season's height.

The new plastic-covered steel pot, approximate inside dimensions 5x4x2 feet, weighs 138 pounds. It is more than twice as large as the inshore wooden box. Now the offshore pot fisherman will be able to string 30 to 100 steel pots per line 1,200 fathoms long. Pulled every 24 hours, the catch can be 20 pounds per pot. It is estimated that an average catch per pot of 10 pounds could make a profitable industry.

The Past 10 Years

During the past 10 years, an increasing number of vessels converted from fish dragging to lobster dragging because lobster was extremely valuable. In 1966, 25.6 million pounds of lobster were taken by inshore pots--and 3.9 million pounds by offshore dragging. Most of the catch was taken in New England waters. Preliminary 1967 figures indicated 5 million pounds taken by trawl, while the pot take fell below the 1966 figure. The catch value increased.

Following is the cruise report of BCF's exploratory vessel "Delaware," which tried the new pot. (Cruise 68-3, March 11-April 5, 1968.)


Delaware Cruise 68-3, March 11-April 5, 1968.

## LOBSTER EXPLORATIONS ON THE CONTINENTAL SLOPE AND SHELF WITH POT (TRAP) FISHING GEAR

BCF's research vessel Delaware completed the first in a series of scheduled cruises to investigate pot (trap) fishing for lobsters on the Continental Shelf and Slope.

The cruises are to be conducted by BCF's Exploratory Fishing and Gear Research Base at Gloucester, Mass. They are part of the continuing program to aid the trawler fleet of the North Atlantic Region.

The pot fishing method, generally used only in near-shore depths, may provide members of the groundfishing and scalloping fleets with the possible means to profitably diversify their fishing effort. The development of an offshore pot fishery to harvest lobster populations from areas of rough, untrawlable bottom would benefit the industry. It would reduce the competition for--and the fishing pressure on--the currently producing fish stocks. Further, an increase in lobster production should stimulate an expansion in marketing to make better use of the potential U. S. market for live lobsters.

During Delaware's Cruise 68-3, exploratory activities were largely limited by the prior necessity to solve shipboard gear-handling problems and to work out practical techniques for fishing at considerable depths with offshore traps. However, limited explorations were accomplished. Twenty-one (21) sets of 11- to 19-pot strings of lobster pots were made. Of this number, 11 caught lobsters; one caught only red crabs; two caught only rock (sand) crabs; and four were without catch of commercial value. The gear was lost on three sets because of weather and the failure of a component of the running gear.

### Fishing Results

The largest lobster catch weighed 150.5 pounds. This catch was taken on a 14-pot string that fished for 77 hours; weather conditions had not allowed the set to be hauled sooner. Excepting one $2\frac{1}{2}$-pound lobster, all were large. It seems significant that all lobsters were in the "parlor" (holding) section of the pots on this set. Because the bait was almost gone and the few remaining scraps were watersoaked, it was obvious that the pots had ceased to fish before the pots were hauled. Based on this very limited experience, it is anticipated that a fishing period of about 48 hours may produce the best results. This would depend on the concentration of lobsters available, water temperature with its consequent effect on keeping qualities of bait and the metabolic rate and rate of activity for lobsters, and the feeding behavior of the lobsters at the time.

Ninety-four (94) lobsters weighing about 389 pounds were taken during the cruise: 78 were legal size totalling about 380 pounds. The average weight was nearly 5 pounds. All except 2 of the 16 short lobsters were taken on one 11-pot string of gear set in Veatch Canyon in 140 to 150 fathoms.

Except for 4 males, the entire catch was either tagged and released near their point of capture, or were preserved for later biological study. The 4 males are being used initially in time-lapse motion picture studies of lobster behavior in relation to lobster pots. The same lobsters are destined for transfer to the State Lobster Hatchery at Martha's Vineyard, Mass., where they will be used in breeding experiments.

During 3 daytime sets--when pots were set and hauled during the day without an intervening period for nighttime lobster activity--only one lobster was caught. However, $1\frac{1}{2}$ bushels of rock crabs were taken in the second daytime set. Of 15 overnight sets, 10 produced lobsters; one produced a heavy catch of red crabs (800 pounds); one produced rock crabs and hake; and one caught cusk and codfish. The two remaining night sets caught nothing.

Two incidental catches of red crabs were made while exploring for lobsters. One (paragraph above) totaled 25 bushels of crabs from 13 pots weighing 800 pounds. The other was $6\frac{1}{2}$ bushels for 208 pounds from 11 pots; this string also caught one 3-pound lobster. It seems this species of crab can be readily taken by pot gear in depths and areas it occurs. It may prove to be a profitable adjunct to lobster pot-fishing.

The cruise was divided into two parts. Two different sets of running gear as well as lobster pots were used:

### Running Gear in 1st Part

The running gear used during the first part was made of 7x19, $\frac{5}{16}$-inch diameter, double

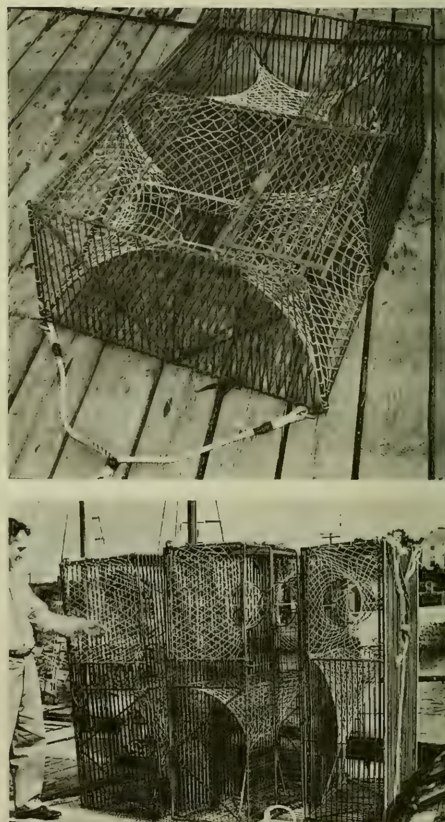
galvanized, aircraft-type wire rope. Its approximate (manufacturer's estimate) breaking strength was 9,800 pounds. This wire was used both for the buoy lines and the mainline to which the pots were attached. For ease in shortening or lengthening the buoy lines (according to length required for depths fished), the buoy lines were cut into 100-fathom sections. The mainline, between points of attachment for the pots, was assembled in 10-fathom lengths; this allowed mainline's length to be easily adjusted to accommodate number of pots desired on a string. All ends of the $\frac{5}{16}$-inch wire were swage-spliced with thimples included. Sections were joined with split-links, swivels, and "figure 8" links--the latter for quick disconnect or connection. In addition, linkage for connection of mainline sections also included another type of quick disconnect coupling for attachment of the pot gangions. For this purpose, a recessed link and "G" hook were used (similar to Vigneron-Dahl or "dandyline" otter-trawl gear). During preliminary test fishing, the recessed link was included in the mainline and the "G" hook was attached to the pot gangion. At the beginning of the cruise's first part, this order was reversed and the "G" hook was included in the mainline, while the recessed link was attached to the gangion. The change was made to help eliminate loss of pots due to accidental disconnection while fishing. Air-filled, plastic, balloon-type floats, of approximately 120 pounds of static lift each, were used to float the buoy lines; the number of floats used during each set was adjusted to the length and weight of the buoy line used for the varying depths fished.

Running Gear During 2nd Part

During the second part, $\frac{1}{2}$-inch diameter, 6x19, galvanized wire rope with an approximate breaking strength of 23,000 pounds was used to replace the buoy lines fished during the first part. This $\frac{1}{2}$-inch buoy line was connected to $\frac{3}{4}$-inch diameter wire used for the mainline; the $\frac{3}{4}$-inch wire had an approximate breaking strength of 42,000 pounds. At one end of each mainline, an extra 300 fathoms of $\frac{3}{4}$-inch wire was included; this provided sufficient length to start wrapping the heavy wire on the winch before the pots were lifted from the bottom. Hardware in both the buoy line and the mainline was reduced to a few swivels attached with split-links and shackles to mechanically spliced eyes in the ends of the wire sections. The pots were attached to the mainline by means of 2 links of chain and shackles. One chain link was fixed to the $\frac{3}{4}$-inch mainline by means of a wire clamp, the other link was shackled to the eye in the end of the pot gangion. No pots attached in this fashion were lost. Each buoy line (made from the $\frac{1}{2}$-inch wire) was buoyed by a cluster of four 55-gallon drums filled with polyurethane foam. The statis lift of each cluster of drums was 1,600 pounds.

Pot Gear in First Part

Pot gear of a variety of designs was fished during the first part of the cruise. A total of 63 pots included 7 BCF-designed experimen-



Deepwater lobster pots (traps) fished during first part of Delaware Cruise 68-3.

tal pots, 31 BCF-built pots modeled after one of 11 original prototype pots of experimental design, and 25 plastic-coated pots built by a cooperating manufacturer but modeled after one of the larger BCF experimental designs. One string of 15 pots was lost when carried downslope during an extended period of bad weather, 8 single pots were lost while perfecting fishing and gear-handling techniques, and 33 were lost when the swage splices weakened during use and parted. To date, grappling operations have been unsuccessful in retrieving the lost gear, but continued efforts are planned for later in the year.

Pot Gear in Second Part

Fewer pots were fished during the second part of the cruise. Twenty-five (25) steel-framed, plastic-coated pots were available aboard ship; these included (1) five of 40x60x18-inch dimensions, and (2) twenty of 36x48x18-inch dimensions. Of the latter, 6 were equipped with plastic-coated wire "kitchen heads" (entrance tunnels); all other pots had twine-knitted kitchen heads. All pots had twine parlor heads. Three uncoated steel pots of varying dimensions were also available; however, only 2 strings of 11 plastic-coated pots each were fished during the 13 sets made on this part of the cruise. No gear loss or damage was sustained.

Shipboard Gear Handling

The system for handling the lobster pot gear aboard ship has passed through successive steps leading toward the best method; this process continues. The primary requirement is that it should be rugged yet rapid, safe, and easy to operate; further, it should be relatively simple and inexpensive to instal. Obviously, the method should contribute to damage-free handling of the pots. A problem that sounds simple--but is difficult to solve--is that the pots frequently come up between the vessel hull and the mainline during haulback. When the pots are lifted to rail height, they become jammed between mainline and ship and tend to be crushed by the pressure exerted. To eliminate this requires major modification of an otherwise straightforward system. Besides reducing time and manpower requirements for handling gear, it is hoped existing deck or gear machinery can be used, or modified, to curtail conversion costs.

Taking lobster pot aboard ship during haulback operation.

The Delaware's system is considered far from ideal. However, it represents one practical solution; although relatively slow and primitive, it is nevertheless quite safe, does not incur damage to or loss of pot gear, uses existing deck machinery, is inexpensive to instal, and is fairly easy to operate. The trawl winches are used to take up and store the buoy lines and mainlines. The lines are hauled over existing deck-mounted sheaves with their fairlead to (and from) the forward starboard gallows and the hanging sheave for that gallows. The gear is both hauled and set in this manner.

During hauling, the buoy line flotation is brought aboard, and the end of the buoy line is shackled to a pennant reaching to the winch drum. The buoy line is taken in by the winch. When the mainline is reached, the first pot is lifted (by the gangion attached to the mainline) from the water. The gilson hook is used to catch the bridle, which attaches the gangion to the pot; after the gangion is unshackled from the mainline, the pot is lifted over the rail with the gilson and dropped upon a table set on the deck. From the table, the pot is slid along a skid (made of pipe) to a rack installed along the starboard rail. The pots remain in this rack where they are emptied, rebaited, and stored until the next set is made.

When the gear is set out, the buoy is put overboard, and the buoy line is payed out as the vessel proceeds at slow speed. When mainline is reached, the gangion of the forward pot (in rack along rail) is shackled to mainline, and the pot is pushed overboard. The next pot in the rack is pushed forward to a point where the pot gangion will reach to the mainline paying out through the hanging sheave in the gallows. This process is repeated until all pots are overboard. The end buoy line is payed out and the buoys are set. All gear is set "on the fly" because otherwise the pots tend to fall to the bottom in a heap--and an appalling snarl results.

More offshore lobster-trapping trials and exploratory fishing are scheduled for June 1968.

## Search for Hake

### 1. THE 'BARON' FINDS FEW HAKE

The BCF-chartered M/V Baron returned to Seattle, Wash., on April 24 after 75 days of experimental gear research (Cruise No. 10). The research concerns development of commercial harvest systems for Pacific hake (Merluccius productus). The areas of operation were off northern Mexico, California, and Oregon. The Baron was assisted by BCF's "John N. Cobb" and "Miller Freeman" in the first 2 areas. She found insufficient hake to warrant a commercial fishery during late winter-early spring. Some immature hake (5 to 13 inches) were found in Santa Barbara Channel and near Point Conception.

Objectives

The major objective was to sample schools of spawning hake to determine the best method and time to make good catches. Other objectives were to: (1) delineate the geographic and bathymetric distribution of hake schools; (2) survey hake schools to determine diel changes and their position in the water column and daily direction of movement, (3) fish at various levels through hake schools during daylight and darkness to establish catch rates and obtain data on school composition; (4) conduct behavior and stratification studies utilizing a remote-controlled underwater strobe camera; (5) provide samples of hake for tests by interested processors in the California area.

Methods of Operation

The cruise schedule was phased in the order of objectives. Sonar and depth sounders were used while attempting to locate schools. Tracklines generally extended 15 to 60 miles off shore, and occasionally to 100 miles.

Vessel and Equipment

The Baron is a 4-man, 96-foot, seiner-dragger-type vessel, powered by a 510 hp. diesel. Pilothouse equipment includes 2 lorans, 2 radars, depth sounder, sonar, and ship-to-shore radio. Deck machinery includes hydraulically operated separate drum trawl winches, net reel, and dual hoists. The Baron can carry about 100 tons of hake.

Gear

The Baron carried "Cobb" pelagic trawls, Universal trawls and aluminum hydrofoil-type otter doors, dual electrical core towing cables.

Weather

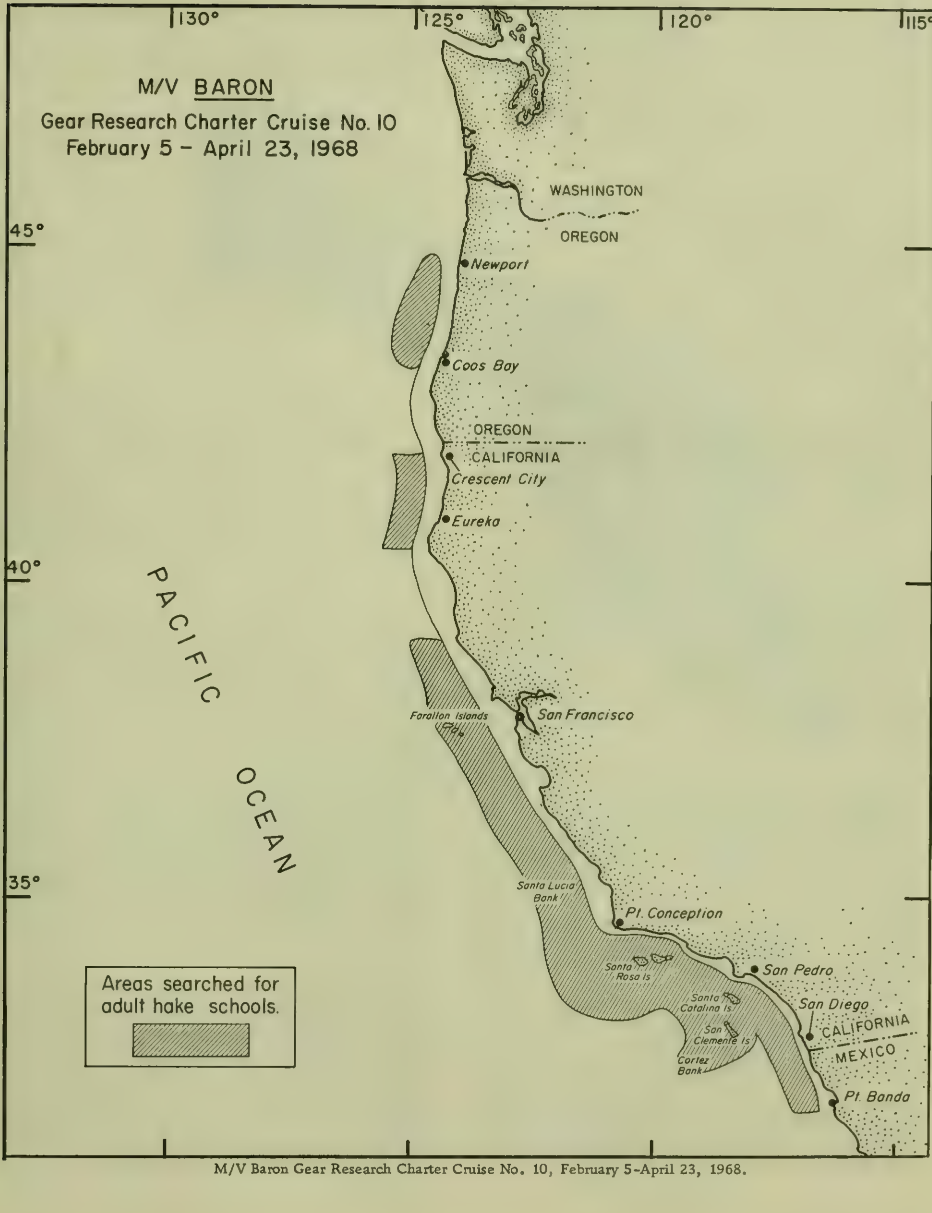
The weather was excellent during the first half; during much of the second half, strong northwesterly winds and rough seas caused some difficulty in searching for schools.

RESULTS

The Baron was unable to locate schools of fish.

On previous cruises adjacent to northern Mexico and southern California, schools of spawning hake had been found. However, no studies had been conducted to determine the feasibility of a commercial fishery in that area. During the Baron's Cruise No. 10, the John N. Cobb and the Miller Freeman were conducting resource assessment and biological studies of hake. They helped the Baron search for adult hake schools.

Although no sizable schools of spawning hake were located, echo-sound tracings showed one promising sign in 225 fathoms 25 miles northwest of San Clemente Island. The traces had the characteristics generally associated with hake schools; they were




M/V Baron Gear Research Charter Cruise No. 10, February 5-April 23, 1968.

tracked over an area 6 miles long and several miles wide. The sign appeared as rather distinct bands approximately 10 fathoms thick. Several attempts were made to fish on the showing, but each tow caught only a few adult hake. It was necessary to fish the trawl at depths greater than the maximum range of the telemetry system (200 fathoms).

Areas Searched

In general, the entire coastal area from Newport, Oregon, to Point Banda, Mexico, was searched from inshore to 60-100 miles offshore (see chart).

In the cruise's first half, tracklines were followed day and night moving southward to off Monterey 60 miles, then south from west of Point Conception to San Pedro. From San Pedro, 20 miles offshore, southeasterly to 75 miles south of the Mexican border and 40 miles offshore. The Baron then turned west to 65 miles offshore, then on a course heading between San Clemente and San Nicholas Islands. The single promising echo sounding was located on this leg of the trackline (25 miles NW of San Clemente Island).

The Baron fished on the heavy traces for 3 days but was unable to take hake in large quantities. Tracklines were then run to Cortez Bank, San Clemente, and the Santa Catalina Islands. The vessel then moved up to Santa Barbara Channel. Zigzag patterns were followed the length of the channel--covering from inshore to Santa Cruz, Santa Rosa, San Miguel, San Nicholas Islands, and to Point Conception.

From Point Conception, tracklines extended out beyond Santa Lucia Bank and up the coast to the Farallon Islands off San Francisco. From San Francisco tracklines were followed to Bodega Bay and 80 miles offshore. Leaving San Francisco the Baron then began following a trackline to Eureka and on north to Crescent City. After searching this area, the tracklines continued to Coos Bay then to Newport. From Newport the Baron returned to Seattle.

## 2. 'COBB' FINDS NO LARGE ADULT HAKE SCHOOLS

BCF's John N. Cobb returned to Seattle, Wash., on March 22, 1968, after a 40-day exploratory fishing cruise (No. 93) off southern California and the Baja Peninsula, Mexico. "No concentrations of fish sign that could definitely be classified as adult hake schools were located during the cruise." The cruise was conducted in cooperation with BCF's Biological Laboratories in Seattle and La Jolla, Calif.

The basic objective was to obtain an estimate of the standing stock of adult hake in a selected portion of the spawning region. Secondary objectives were: (1) to collect samples of hake for stomach analysis and for studies of size, sex, and maturity in relation to distribution and behavior; and (2) to study the diel and schooling behavior and short-term movements of hake by continuous observation of individual schools.

Gear

Searching was conducted using a low-frequency, high-resolution echo sounder and a sonar. The sonar transmits at 30 kHz and has a specified maximum range of 800 fathoms.

Fishing gear was a BCF Universal trawl ($2\frac{1}{2}$-inch mesh) equipped with a $\frac{1}{2}$-inch mesh codend liner. The trawl was rigged with aluminum hydrofoil doors and three-leg 30-fathom bridles.

Depth of fishing was determined by an electrical depth telemetry system. The system's principal components are the main towing warps ($\frac{5}{8}$-inch diameter electro-mechanical cable), pressure-sensitive transmitters, and pilothouse readout meters. Transmitters were positioned at the termination of the warp at the starboard door, and at the termination of the port bridle to the footrope Initially, the system was calibrated for a maximum depth range of 200 fathoms. However, it was found necessary to fish at greater depths--so one side of the system was modified by installation of a variable resistor and than recalibrated to operate at a maximum depth of 300 fathoms.

Methods

The area selected for study was bounded on the north by Point Conception, Calif., and on the south by Point Banda, Mexico; it extended seaward 60 to 100 miles. It was chosen on the basis of the distribution of hake eggs and larvae, vessel capabilities, and the time available for the survey. The area actually surveyed was slightly larger than that originally selected.


Survey area John N. Cobb Cruise No. 93.

During the first half of the cruise, the survey was run in a north-to-south direction on tracklines run perpendicular to the coast at 20- to 25-mile intervals. During the second half, the survey took place in the opposite direction on tracklines which were not uniformly spaced and generally intersected the coast at oblique angles.

Searching was conducted at the vessel's normal cruising speed of 9.3 knots. The echo sounder was set to record to a maximum depth of 275 fathoms. The tilted (wide angle) beam of the sonar was used because of the depth limitations of horizontal scanning.

Usually the vessel operated on the tracklines during the period 0600 to 2000. Little time was spent searching at night.

Trawl hauls were made whenever significant fish sign was detected. Specimens from each haul were either processed at sea or frozen for laboratory analysis.

## Results

No concentrations of fish sign that could definitely be classified as adult hake schools were located. Midwater sign having some characteristics generally associated with hake schools was observed at 4 locations in Channel Island area. All of the sign was located during daylight between 195 and 250 fathoms. The sign appeared as rather distinct bands approximately 10 fathoms thick. In each instance, the main body of sign was less than 4 square miles in area. A trawl haul could be made at only 3 of the locations.

Small amounts of adult hake (less than 100 lbs./hr. towed) and a minor catch of miscellaneous species were taken in two of the hauls. The catch in the third haul ($\frac{1}{2}$ hour) was 5 pounds of fish, jellyfish, and pelagic shrimp.

During the 2 hauls in which hake were caught, it was necessary to fish the net at depths greater than the maximum range of the telemetry system. Consequently, it is especially difficult to determine the reliability of the catches as measures of species composition and abundance. However, the echogram records from these locations, and from the other sites where "hake-like" sign was observed, indicate that significant densities of fish were not observed. In each case, a relatively minor reduction in volume setting on the sounder resulted in complete disappearance of the sign. The echograms, together with the results of trawling, suggest that the sign represented an assemblage of macroplankton mixed with small quantities of fish.

Juvenile hake ($\leq$ 3 years of age) were captured in inshore areas during 2 occasions when the depth telemetry system was calibrated. The calibration procedure involves lowering the trawl to the bottom and adjusting the system while the vessel drifts. Also, one bottom haul was made at 52 fathoms depth off San Luis Obispo Bay; a variety of demersal species, but no hake, were caught.

The Cobb devoted nearly all its effort to searching for hake. Very little time was spent observing the behavior of the concentrations of sign observed. This was carried out by BCF's "Miller Freeman" and the BCF-chartered "Baron."

## Meaning of Cruise Results

The results of this survey parallel those of similar surveys in 1963, 1964, 1965, and 1966. Again, despite relatively widespread occurrence of hake eggs and larvae in the area of operation, which is indicative of a large spawning population, significant quantities of adult fish could not be located. To date, only one large concentration of hake has been observed. The following might be a few possible reasons for the observed results: (1) in all years, searching was restricted to a maximum depth of 275 fathoms, (2) the coverage and timing of the surveys did not coincide adequately with the geographic and temporal distribution of the spawning hake, and (3) hake infrequently aggregate in large schools for spawning.

Although the possibility exists, it appears unlikely that a significant amount of spawning would take place at depths greater than 275 fathoms. Spawning at these depths is certainly rare, if not unknown, among hakes and Gadoid fishes. Also, there is a variety of biological arguments against successful spawning occurring at these depths.

It has not always been possible to schedule surveys to cover spawning areas during periods of peak activity. But it appears that the timing and areal coverage of the surveys has been adequate to insure a high probability of at least occasionally detecting large spawning aggregations if they existed. In this regard, however, it should be noted that coverage of the offshore portion of the spawning region--those waters 100 to 200 miles from the coast--has been relatively restricted.

## Large Schools Not Common

The results of the surveys indicate that hake do not often gather in large schools--greater than 10-15 square miles in area--and that spawning schools do not maintain themselves for long periods of time. This is contrary to what the scientists of the BCF Seattle Exploratory Fishing and Gear Research Base expected based on their knowledge of hake spawning in Puget Sound. The one spawning population observed there is densely massed in a 12- to 15-square mile area; spawning takes place over several months. School size apparently is maintained by more or less continuous emigration and recruitment. If, when spawning, the ocean hake population segregates into small scattered schools which are maintained for relatively brief periods, survey observations are more explicable than if it is assumed spawning behavior is such that large, dense concentrations are formed. However, regardless of the hake's spawning distribution and behavior, it is difficult to account for the results of the 1968 survey. During this survey, 3 vessels searched intensively a significant portion of the spawning region without success. The scientists conclude: "It is apparent that a de-

tailed review of all past survey data is necessary before further attempts are made to assess the abundance and availability of spawning adult hake."

For further information contact: Dayton L. Alverson, Base Director, Exploratory Fishing and Gear Research Base, 2725 Montlake Boulevard East, Seattle, Wash. 98102.

## 'Oregon' Dredges Callico Scallops Off Georgia and Florida

BCF's R/V Oregon returned to St. Simons Island, Georgia, on April 27 after 16 days of scallop explorations off the east coasts of Georgia and Florida (Cruise 128). This was the sixth in a series of industrial development cruises to keep an up-to-date check on the Florida east coast grounds. Previous explorations showed these grounds hold the greatest potential for commercial utilization of calico scallops (Pecten gibbus).

### Primary Objective

The primary objective of cruise 128 was to continue dredging operations, emphasizing the area from southern Georgia to Cape Kennedy. Between Doboy Sound, Georgia, and Melbourne, Florida, 210 dredging stations were occupied in the $5\frac{1}{2}$- to 40-fathom range. Of these, 8-foot tumbler dredges fitted with 2-inch bag rings 20-rings deep were fished at 178 stations; 6-foot tumbler dredges fitted with 2-inch bag rings 13-rings deep were fished at 31 stations. All dredges were fitted with $2\frac{1}{2}$-inch stretched mesh nylon liners.

Four standard assessment transects were conducted from 10 to 40 fathoms in areas established during September 1967 (Cruise 121) and occupied during each cruise in the series.

East of New Smyrna Beach, in 23 to 28 fathoms, maximum catches ranged up to 20 bushels of scallops per 30-minute drag. Counts ranged from 92 to 133 meats per pound and yielded 3 to 3.6 pounds per bushel.

### Catch Rates Significant

Northeast of Cape Kennedy, between latitudes 28°30' N. and 29°00' N., where commercial concentrations were located during February 1968, catch rates remained commercially significant. They ranged up to 18.9 bushels per 30-minute drag in 24 to 26 fathoms. Counts ranged from 93 to 101 meats per pound and yielded 3 to 4 pounds per bushel.

In the southern portion of the area surveyed, east of Cocoa Beach, catches ranged up to 14.7 bushels per 30-minute drag in 21 to 26 fathoms. Counts ranged from 97 to 151 meats per pound and yielded 2.2 to 3.8 pounds per bushel.

Subcommercial-size scallops were caught on the northernmost transect (southeast of Flagler Beach). Although scallops were smaller than those further south, the meats were firm and yielded 5.3 pounds per bushel. Counts ranged from 116 to 130 meats per pound. (See page 32 for chart.)

In general, meat counts were higher and meat yields lower, although commercially acceptable, than at other times during the current series.

Two days of dredging demonstrations were conducted for industry observers. Fishing information and assistance were provided to 3 vessels in the scallop fishery.

## 'Oregon' Surveys Midwater Schoolfish Off East Coast

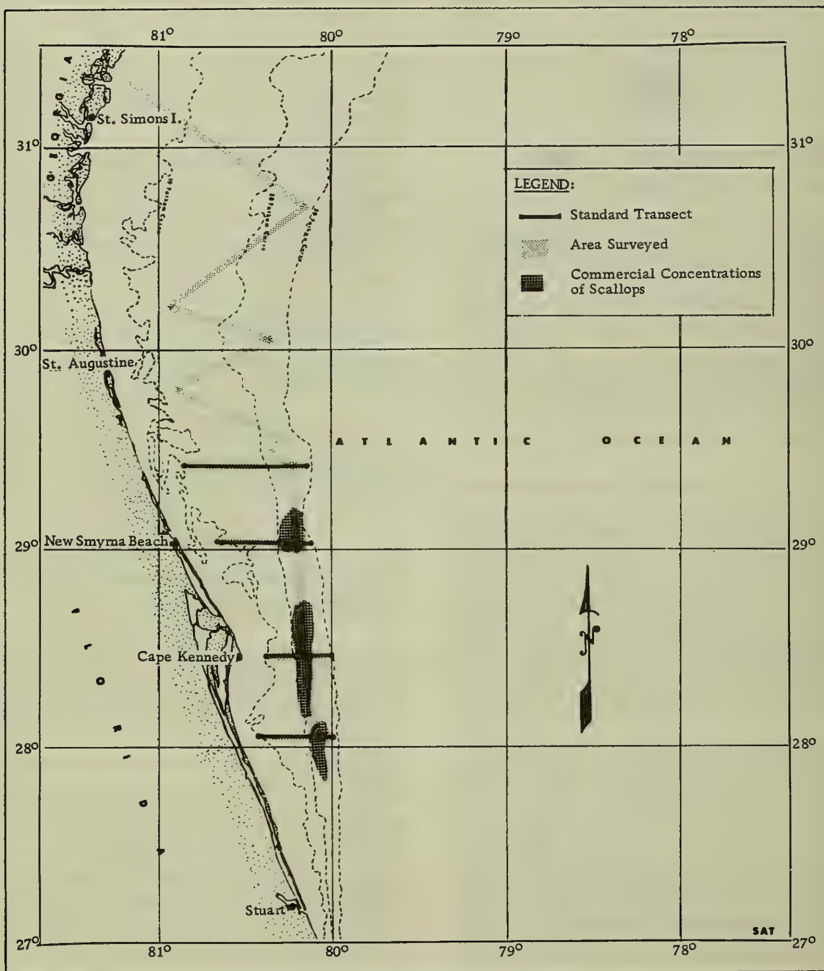
The Oregon completed the second in a series of six bimonthly midwater schoolfish survey cruises and returned to St. Simons Island, Ga. (Cruise 127, March 12-21, 1968.)

The purpose of the cruises is to provide information needed to develop exploratory fishing patterns for pelagic schoolfish in coastal waters (5-20 fms.) between Cape Hatteras, N.C., and Jupiter Inlet, Fla.

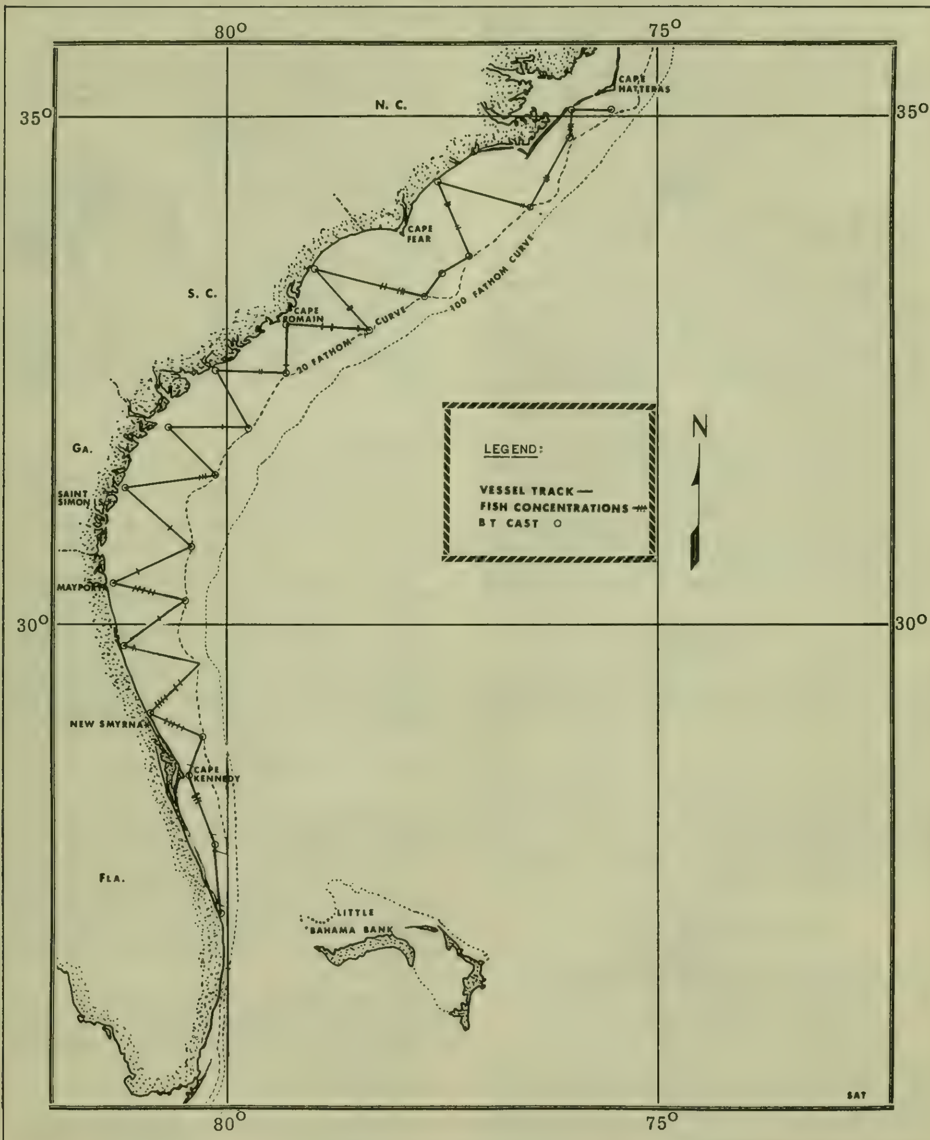
High resolution vertical echo tracings were obtained on 26 standard transects. A water-temperature profile was acquired at the beginning and end of each transect.

### What Oregon Found

Preliminary examination of echo-tracing data shows that extensive concentrations of bottom and midwater fish schools again were present off Florida (north and south of New Smyrna Beach and southeast of Mayport).




Oregon Cruise 128, April 12-27, 1968.




R/V Oregon Cruise 127, March 12-21, 1968.

Off Georgia, limited midwater fish schools were recorded east of St. Simons Island and Sapelo Island. Off the Carolinas, sizable concentrations were recorded east of Cape Romain in South Carolina, and north and south of Capes Fear and Lookout in North Carolina. (See page 33 for chart.)

## 'Gilbert' Compares Threadfin Shad With Nehu As Skipjack Bait

One mission of BCF's Charles H. Gilbert's Cruise 108 in Hawaiian waters, March 20-April 18, was to test threadfin shad (Dorosoma petenense) in comparison with nehu (Stolephorus purpureus) under pole-and-line fishing conditions for skipjack tuna (Katsuwonus pelamis).

Five schools of skipjack tuna were fished while threadfin shad were alternated with nehu during successive 3-minute fishing periods. Catch data and skipjack abundance were recorded satisfactorily using a 20-channel event recorder and automatic time-lapse photographic equipment. The size range of skipjack caught was 37.7 to 62.6 cm. fork length.

The catch data are summarized below:

| Station Number | Number of Fishing Periods | Total Catch | | Catch Per Minute[1] | |
|---|---|---|---|---|---|
| | | Shad | Nehu | Shad | Nehu |
| 11 | 12 | 191 | 168 | 10.8 | 9.3 |
| 12 | 18 | 435 | 383 | 16.6 | 14.4 |
| 14[2] | 1 | 2 | - | 0.6 | - |
| 15 | 7 | 31 | 92 | 3.5 | 7.5 |
| 20[3] | 8 | 78 | 97 | 7.1 | 8.1 |
| Totals. . . . . . . . . . | | 737 | 740 | 7.7 | 9.8 |

1/4 men fishing almost constantly.
2/Only shad chummed at station 14.
3/Catch included skipjack, kawakawa (Euthynnus affinis) and yellowfin (Thunnus albacares).

## Fish Flown Round the World Remain Eminently Edible

Many fish that reached the April San Francisco convention of the National Fisheries Institute had traveled much farther than the participants. The fish, flown round the world, were involved in a plan to test the new leak-proof container designed by BCF's Gloucester (Mass.) Technological Laboratory (CFR March 1968).

Five demonstration shipments of fresh haddock fillets--and cooked, whole northern shrimp--were sent in the containers from Gloucester to San Francisco. There were 2 refrigerated-truck shipments: one from Portland, Maine, the other from Gloucester. One container was air-shipped from Gloucester via Honolulu, another via London. The fifth shipment nearly circled the earth: Boston to New York, London, Frankfurt, Istanbul, Beirut, Teheran, New Delhi, Bangkok, Hong Kong, Tokyo, Honolulu--and San Francisco.

The Results

All air shipments arrived in time to be displayed. All were in good condition and had ice left, though they had not been re-iced on the way.

The 100-hour round-the world shipment still had 10 of the original 39 pounds of ice.

The truck shipments were not a close second. Both were in transit 150 hours and arrived too late. About half the fish in insulated boxes were partly frozen--but in excellent condition.

## New Shrimp Process Shown to Public

A new process to prepare northern shrimp for peeling on machines was demonstrated to the public at Wrangell, Alaska, in May by its developer--BCF's Ketchikan Technological Laboratory.

The new process permits use of fresh shrimp rather than aged shrimp on the mechanical peelers. Color retention is excellent and the product is much improved.

How Process Works

The process uses a 2-cook sequence in water: 1) The shrimp are cooked for a short

time at a high temperature. This stabilizes the orange-red surface color and preserves quality. 2) The high-temperature treatment is followed by a longer cook at a lower temperature. This makes it easier to peel the shrimp.

## Larger Lobsters Are Active at Night, Study Shows

The SCUBA team of BCF's Boothbay Harbor (Maine) Biological Laboratory has completed a study of the night behavior of the lobster during the summer and winter. The divers observed and counted lobsters inside and outside their burros from sunset to sunrise and down to 70 feet.

The observations indicated that lobsters of about 2-inch carapace length did not leave their burrows at night--while lobsters over 2-inch carapace length were active at night.

Of these larger lobsters, about 80% in summer--and about 40% in winter--ventured from their burrows after sunset and returned before sunrise.

Predators Also Active At Night

Finfish that are known predators of the lobster--longhorn sculpin, cunners, sea ravens, cod, goosefish, and wolffish--are relatively common and active inhabitants of the inshore ocean bottom during summer nights. In the winter, only a few inactive species of these finfish are seen.

During the study, bottom water temperatures ranged from 14° to 16° C. in summer and from 1° to minus 1° C. in winter.

## Some Alaskan Fish Semidormant Below 40° F.

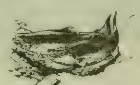
Biologists of BCF's Auke Bay (Alaska) Biological Laboratory discovered something interesting during underwater observations of Sashin Creek in April. They found the resident rainbow trout, juvenile coho salmon, and Dolly Varden char semidormant at stream temperatures below 40° F.

Although there were 20,000-25,000 resident salmonids in the creek, excluding pink and chum salmon fry, only a few could be found. The fishes found beneath large rubble in pools or deep stream areas were torpid. They made no effort to escape.

Different from 1967 Survey

The behavior and distribution of these fishes were markedly different during a similar underwater survey in June 1967. Then, they were distributed widely throughout Sashin Creek and segregated according to ecologic conditions in the stream.

The biologists planned to make frequent underwater surveys in May to find out when these fishes resume normal activity in the stream.



## Catfish Form Tight Schools in Colder Weather

Weather affects the schooling behavior of channel catfish (Ictalurus punctatus). This was found in a study of marked catfish conducted in experimental ponds by BCF Branch of Exploratory Fishing personnel at Kelso, Arkansas.

Channel Catfish

The passage of 2 cold fronts resulted in the formation of tight schools in the center of a pond. Before, the catfish were scattered in shallow warm water at the edges of the pond.

# ARTICLES

## THE NEW THREAD HERRING FISHERY IN EASTERN GULF OF MEXICO

By Charles M. Fuss, Jr.*

The Atlantic thread herring, Opisthonema oglinum (Le Sueur), is a marine fish of the family Clupeidae that ranges from the Gulf of Maine to Brazil and throughout the Gulf of Mexico (Butler, 1961; Berry and Barrett, 1963). Thread herring seldom exceed 10 inches and are characterized by a thread-like elongation of the last ray of the dorsal fin (fig. 1). This characteristic led to the name "hairy back" frequently used by commercial fishermen.

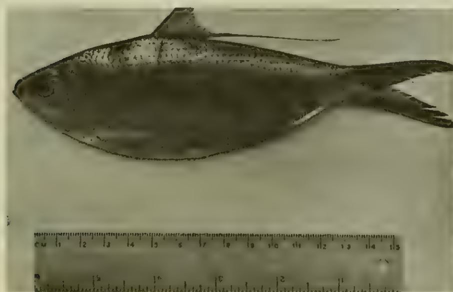


Fig. 1 - The Atlantic thread herring, Opisthonema oglinum (Le Sueur).

Thread herring occur in great numbers on the west coast of Florida, particularly between Tampa Bay and the Florida Keys. They are frequently concentrated in nearshore waters, generally inside the 10-fathom contour. The earliest report on the extent of thread herring schools in the eastern Gulf resulted from tuna bait explorations by the Bureau of Commercial Fisheries' "Oregon" in 1953 (Butler, 1961). In 1967, Bullis and Thompson--on the basis of aerial and surface surveys by BCF's Exploratory Fishing and Gear Research Base, Pascagoula, Miss.--estimated that the Gulf stock is about 1 million tons. The size and significance of the resource have been further confirmed by aerial surveys of the St. Petersburg Beach Laboratory and by commercial exploratory fishing (Sykes, 1967).

### THE DEVELOPING FISHERY

In 1961, Butler described the early (1953-60) developments of the fishery on the Florida Gulf coast. The industrial fishery began in the St. Petersburg area during winter 1958-59, when catches up to 27 tons per set were made with lampara seines. Single-boat purse seining, introduced in winter 1959-60, produced catches of 5 to 40 tons per set. The fish were transported to pet food and reduction plants in the northern Gulf of Mexico because landing facilities were not available on the lower west coast. Adverse weather during the winter, and a shortage of freight vessels to transport the catch, further limited development of the fishery.

In 1957, a small bait fishery for thread herring and other clupeoids was started in St. Petersburg by one vessel equipped with a lampara seine. Single-boat purse seining began in 1958. Fishing has continued intermittently since then, and a converted menhaden vessel was added in 1967. The same vessels are used for taking food fish in offshore waters.

Predictions of a continuing decline in Atlantic menhaden stocks (Henry, 1966) and the promising results of Gulf thread herring surveys generated intense commercial interest in the further development of an industrial thread herring fishery on the Florida west coast in early 1966. In August 1967, a reduction plant (fish meal, oil, and solubles) was opened on Charlotte Harbor in the Fort Myers area. Initially, the plant was supplied by one vessel fishing a single-boat purse-seine rig (fig. 2); a typical menhaden vessel (2-boat rig) joined the operation in October. Landings at the plant by the end of December totaled about 3,750 tons1/ of thread herring.

In November, Louisiana-based menhaden vessels (fig. 3) entered the fishery off Fort Myers. One of these vessels made a record

*Fishery Biologist (Research), BCF Biological Laboratory, St. Petersburg Beach, Florida 33706
1/Unpublished BCF statistical data.
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catch of 500 tons in 5 hours. Landings in Louisiana by the end of December were about 1,150 tons[1/]. These catches, plus the Florida landings, totaled almost 5,000 tons during September-December.

Fishing has been restricted to a relatively small area off Fort Myers in nearshore waters about 3 to 10 fathoms deep (fig. 4).

Fig. 2 - Single-boat purse-seine rig used in thread herring fishery.

Fig. 3 - Menhaden vessel used in thread herring fishery.

## LEGAL PROBLEMS OF THE FISHERY

The new thread herring fishery has been beset with conflicts reminiscent of those in the menhaden fisheries. Sport fishing interests have become aroused, bait dealers and gill net fishermen are concerned, and conservationists view developments with misgivings. The State of Florida does not allow the taking of food fish with purse seines in territorial waters (out to 10.5 miles on the Gulf coast). The law was initially interpreted to include incidental food fish captured in thread herring sets. In November and December 1967, enforcement of the law caused the temporary withdrawal of the Louisiana vessels from the fishery. A court decision in February 1968 included an interpretation that allows a certain percentage of food fish in industrial fish catches, subject to administrative regulation by the Florida Board of Conservation. As a result, prospects for continued development of the fishery are good.

## SHOULD THE FISHERY CONTINUE?

The world demand for animal protein is increasing steadily. Marine fish, particularly clupeoids, are becoming more important in supplying that need. Chapman noted in 1967 that the trend in world fish catches shows an increase in landings of clupeoid fishes from one-quarter of the catch in 1948 to about one-half in 1965. He inferred these reasons for the increased production: (1) the ocean contains more of them than of any other group presently harvested, (2) they congregate in large shoals that can be caught efficiently and cheaply, and (3) animal-husbandry practices in the past 20 years have been revolutionized by adding animal-protein supplements, primarily fish meal, to the diets of domestic fowl and mammals.

Despite increasing world utilization of industrial fish for animal food and industrial products, production in the United States has declined steadily in recent years. In 1962, the Atlantic and Gulf menhaden fisheries produced a record 2.3 billion pounds of fish but, in 1967, the yield was down to 1.2 billion pounds. The drop in production was due primarily to the failure of the Atlantic menhaden fishery. As a result, imports of fish meal increased from 44.7 percent of U. S. consumption in 1962 to 75.5 percent in 1967 (Lyles, 1968).

The new thread herring fishery is of great importance in light of these facts. A stock estimate of 1 million tons, a demonstrated catch of 5,000 tons in 4 months, the continuing decline of menhaden stocks, and the increasing world demand for animal protein--all show the definite need and feasibility of this fishery's further development.

## THE NEED FOR BIOLOGICAL INFORMATION

Little has been published on the biology of thread herring--except work on its identification (Berry and Barrett, 1963) and a survey of Gulf stocks and fishing methods (Butler, 1961).

The orderly development and wise management of any fishery require considerable knowledge of the biology of exploited stocks. Although many consider the sea's resources almost limitless, a critical examination of world fisheries presents disturbing evidence to the contrary. In 1967, Moe discussed fishery production and management with special

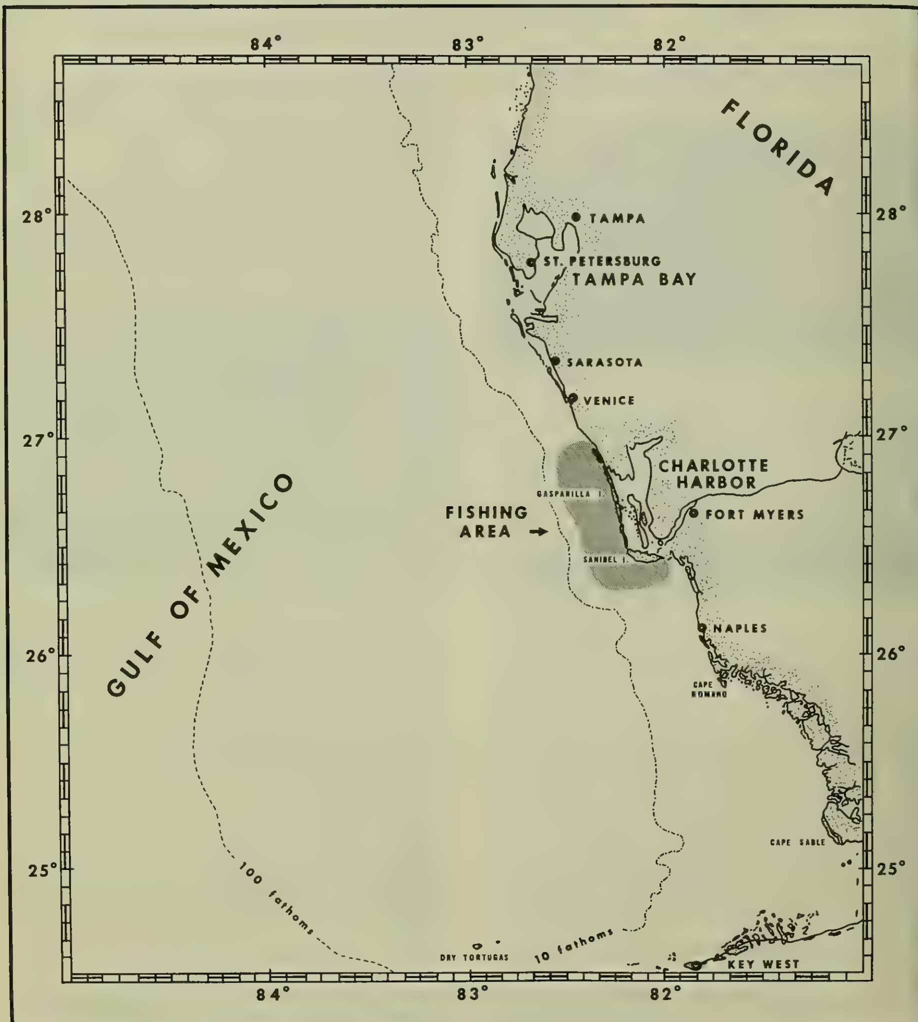


Fig. 4 - Thread herring fishing grounds on Florida west coast.

reference to purse seining. He gave examples that illustrated the effects of overfishing a marine finfish resource. He stated that the primary step toward wise management of any fishery is to develop thorough knowledge of the fish's life history.

Also, the effects of that fishery on other commercial and sport fishes should be understood. Heavy exploitation of a single species with modern fishing methods may affect the general ecology of an area. These effects should be monitored along with those directly pertinent to the exploited stock.

Many controversies have arisen over the use of purse seines for menhaden along the Atlantic and Gulf coasts, particularly with the taking of food fish. This problem prompted studies by Smith (1896), Knapp (1948), Baughman (1950), and Gunter (1963). They concluded that a purse-seine fishery has a negligible effect on food and sport fishes because the numbers taken are insignificant. Initial analyses of catches of thread herring by the St. Petersburg Beach Laboratory and the Pascagoula Exploratory Fishing and Gear Research Base show that food fish constitute only 0.35 percent of the catch. However, the question is not resolved to the satisfaction of all conservationists.

## BIOLOGY OF INDUSTRIAL SCHOOLFISHES PROGRAM

Therefore, biological studies on thread herring are extremely important to the development of the fishery. Recognizing possible developments, our laboratory began the Biology of Industrial Schoolfishes Program on July 1, 1967.

The program will investigate the biology of all potentially important industrial schoolfish (excepting menhaden) in the eastern Gulf of Mexico. Limited funds and personnel, however, will restrict initial studies to thread herring, particularly to life history and distribution. Objectives are to:

1. Define the life history of the important industrial schoolfishes of the area.

2. Determine seasonal and annual migrations and fluctuations in abundance.

3. Understand the influence of environmental factors on the movements, behavior, and concentrations of the fishes.

4. Document the importance of contiguous estuaries and determine the origin of fish stocks.

5. Contribute to the taxonomic literature of various species, particularly the juvenile and postlarval stages.

6. Determine behavioral patterns that include feeding habits, schooling characteristics, diel activity, and responses to natural stimuli.

7. Conduct oceanographic surveys of the area for seasonal changes of temperature, salinity, water currents, and water clarity.

8. Understand the effects of fishing pressures and natural mortality on the population dynamics of the species.

9. Construct estimates of maximum sustainable yields, formulate management principles for the fishery, and develop methods to forecast distribution and abundance of stocks.

## INITIAL RESEARCH

Field sampling already had begun in April 1967, when the laboratory's research vessel "Kingfish" was equipped with a hydraulic gill net power block (figs. 5 and 6). Monofilament gill nets of various mesh sizes are used for sampling in the deeper parts of estuaries and the Gulf. Plankton tows are made at each gill net station and oceanographic data are recorded. Beach seines and lift nets are used in shallow areas and near docks and bridges. Sampling to date has been limited to Tampa Bay, the Charlotte Harbor-Pine Island Sound area, and nearshore Gulf waters between the two estuaries (fig. 4).


Fig. 5 - R/V Kingfish hauling a gill net with a power block.

Fig. 6 - Threadherring gilled in a 2-inch monofilament gill net.

Samples have been collected from the commercial catch since the beginning of the fishery off Fort Myers. A systematic port sampling program is beyond our means at present, but the fishermen have been cooperative in preserving samples from individual purse-seine catches. Fishing log books and charts were provided for all vessels engaged in the fishery to document catches, effort, and fishing areas.

Laboratory processing of fish samples includes measurements of body length and depth, body weight, and gonad weight. Sex is determined, and scale, stomach, and gonad samples are preserved for analysis.

Some highlights of research results to date (April 1967-February 1968) are:

1. Thread herring catches per unit of effort (30-minute set with a 2-inch-mesh monofilament gill net) in Gulf waters off St. Petersburg Beach reached a peak in early summer and declined with falling water temperature in the fall. Heavy concentrations of fish (as shown by commercial fishing) off Fort Myers during fall and winter indicate a general southerly or possibly offshore movement when coastal waters are cooling. Schools of thread herring, however, do occur off St. Petersburg in winter (Butler, 1961).

2. Juvenile thread herring appeared in beach seine samples along Gulf beaches in the St. Petersburg area during summer and disappeared by fall, indicating an offshore movement of juveniles.

3. Thread herring had fully developed gonads at $5\frac{1}{2}$ to $6\frac{1}{2}$ inches fork length off St. Petersburg Beach in early April. Spent gonads, indicative of spawning, appeared by late May when water temperature was about $81^{\circ}$ F. Gonad development indicates a spawning peak in June. No gonads were ripe in July. The gonads of fish from commercial catches off Fort Myers during winter have been undeveloped.

4. The ratio of males to females in the summer thread herring population off St. Petersburg Beach was about 1 to 5; that of the winter population off Fort Myers was about 1 to 1.

5. Thread herring with a mean fork length of about 6 inches constitute the bulk of commercial catches in the Fort Myers area.

6. Preliminary analyses of catches of purse seines show that the only important food fish in purse-seine catches have been sand sea trout (Cynoscion arenarius; 0.15% of catch) and spanish mackerel (Scomberomorus maculatus; 0.19% of catch).

COOPERATION WITH INDUSTRY

We have tried to maintain close contact with industry in the development of the fishery. Plant operators and fishermen have been very cooperative in providing catch statistics and samples. They have shown much interest in the biological aspects of the fishery.

We have attempted to provide direct services to the new industry when requested. Fishing trials with monofilament gill nets of various mesh sizes were made in the Fort Myers area for fishermen to establish the minimum size required to prevent gilling of fish. The information was used in the selection of purse-seine netting. Laboratory personnel also have served as expert witnesses in court proceedings to give testimony on the quantities of food fish in purse-seine catches. The data presented were instrumental in obtaining a favorable court decision for continuation of the fishery.

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### FISH HEARING LIKENED TO HUMAN SMELL

A fish is in about the same predicament as a man trying to determine the source of an odor as far as telling the location of a sound source is concerned, the Acoustical Society of America meeting in New York was told by Prof. Willem van Bergeijk of the Center for Neural Sciences at Indiana University. Because humans have only one nose, the only way they can detect the direction of a smell is by "sniffing it out," trying here and there until stumbling upon the source. It is believed fish have the same problem locating the direction of a sound since fish have only one middle ear.

Fish can locate a sound source if they are close to it, but they do this through their lateral line (tiny sensory buds spread over the body) which is sensitive not to sound but to the small water currents near the sound source, such as those caused by a wriggling worm. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966 by Science Service, Inc.)

# RECENT INNOVATIONS FOR TRAWL NET REELS

By William L. High*

Over 90% of Pacific Northwest United States trawlers now are equipped with trawl net reels. Reels permit many vessel crews to be reduced from 4 to 3 men. Hydraulic power has largely replaced the original cable drive "yo-yo" system. Restrictive flanges on reels confine the groundlines. Flanges bolted around the core allow convenient adjustment. The trawler "Westness" has a net reel that holds 2 complete trawls, and the crew can set either trawl with no loss in fishing time. The net reel aboard the Bureau of Commercial Fisheries Research Vessel "John N. Cobb" has been modified so that it also operates as a constant-tension winch. Most net reel-equipped trawlers also have a stern rail roller to reduce chaffing and wear to web and groundlines as they slide over the stern.

Trawl net reels were first introduced to United States fishermen of the Pacific Northwest in 1954 (Alverson, 1959). The reel greatly reduced the work while setting or retrieving a trawl. Many captains credit the trawl net reel as being a major factor in reducing their crews from 4 to 3 men. Since no major modifications to vessel or gear were necessary, the reel was easily installed on nearly any stern trawler (Wathne, 1959).

A net reel provides several advantages over the early method of fishing, which used bypass links to wind groundlines on the main towing winch and to strap in the net. Now, the groundlines are transferred from the otter board to the reel and are quickly wound onto the drum. Forward sections of the trawl are also wound onto the drum before the bag is maneuvered to the vessel's starboardside for unloading. Since the net is no longer lifted high into the rigging while the web is strapped in, chances of injury to fishermen by the swinging floats are eliminated.

## RECENT INNOVATIONS

Since 1954, numerous worthwhile improvements have been made on net reels:

### Hydraulic Drives

Early reels were turned by a cable wound around the reel and attached to the main winch. The cable was rewound onto the reel by water resistance on the trawl as it was set over the stern. This technique was called "yo-yo" power (Lippa, 1967) and has now been replaced largely by hydraulic power sources.

### Groundline Flanges

The basic design of the trawl net reel requires fishermen to guide the retrieved groundlines evenly back and forth on the reel core. This action prevents cable from building up excessively and the trawl being recovered unevenly. Also, groundlines sometimes foul if unattended.

To eliminate the need for levelwinding groundlines by hand, some captains have added a second flange about 12 inches inside each end flange (Fig. 1). Groundlines are wound within this restricted area and need not be closely attended. As the net reaches the reel, the groundlines are pushed through a notch on the inside flange (Fig. 2) and the net wound on the center part of the reel. Until recently, the inside flanges were welded to the core, but a more versatile means is illustrated in figs. 1 and 2. The flange is securely bolted around the core and can easily be removed or adjusted.

### Dual-Section Reels

The trawler Westness has incorporated a useful modification that allows the crew to change trawls rapidly. This net reel is very large and is divided in the middle with a flange (Fig. 3). One net complete with groundlines is attached to each section. The value of the dual-section reel is twofold. First, most trawlers carry at least one spare trawl in the event that gear is lost or damaged severely while fishing. If a spare net is carried on the reel, no fishing time is lost when the primary net requires repair--because this can be

*Assistant Chief, Gear Research Unit, BCF, Exploratory Fishing and Gear Research Base, Seattle, Wash. 98102.

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done while the spare trawl is used during the next tow. Secondly, captains like to have one net rigged that sweeps the bottom when capturing flatfishes and another that has a high mouth opening for capturing rockfishes.

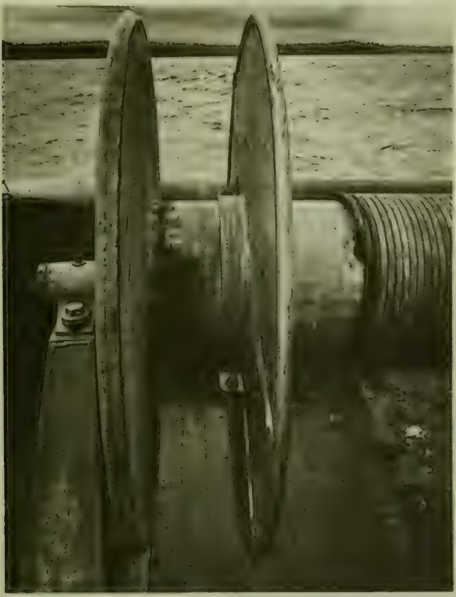

Fig. 1 - Dual flanges keep the net groundlines in a restricted section with minimal supervision. Note that the inside flange is of two half circles bolted around the drum core to permit easy removal or adjustment of width.

Fig. 2 - When the groundlines are nearly retrieved, they are pushed through a notch in the inner flange so that the trawl will be wrapped onto the center portion of the core.

If the captain operates with nets having different fishing characteristics, he can immediately set whichever trawl is appropriate. It is only necessary to firmly tie the unused net in place so that it will not loosen when the reel rotates.

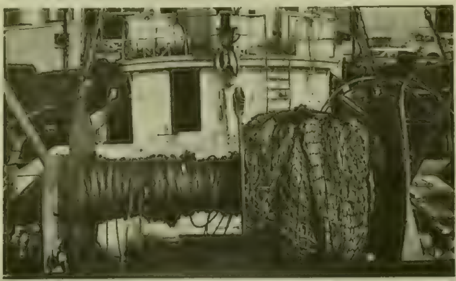

Fig. 3 - The stern trawler Westness is shown with a dual-section net reel, which can hold two nets simultaneously. Either trawl may be set without adjustments because the remaining trawl is firmly lashed in place while the reel is turned.

Fig. 4 - The hydraulic bypass system on the John N. Cobb's trawl net reel. This system allows the net reel to be used as a constant-tension winch.

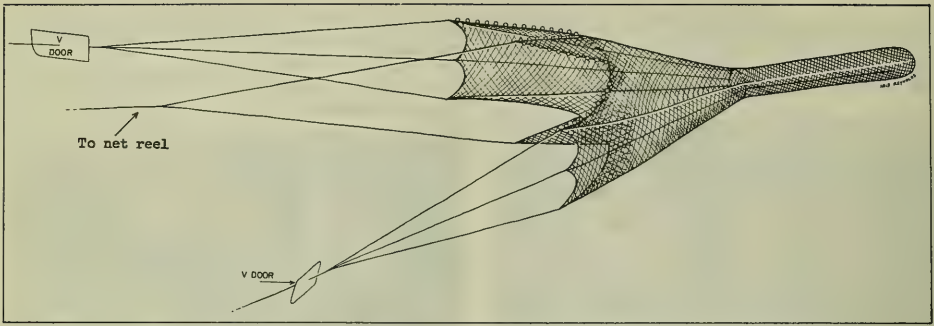


Fig. 5 - Arrangement of an eight-bridle trawl using a trawl net reel for the third towing point.

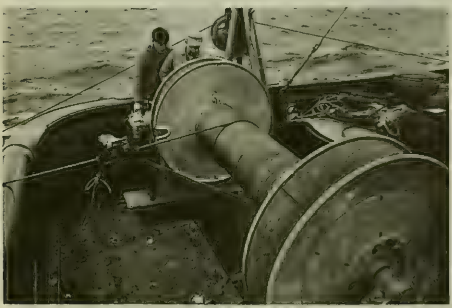

Fig. 6 - Trawl net reel modified to operate as a constant-tension winch and net reel. A cable meter is attached to the third wire after the net has been wound off the reel. Note the quick disconnect waterproof plug near the axle on the end flange, which links telemetry packages on the trawl to the vessel by electromechanical towing cable. A stern rail roller is shown at the left of the picture. (Photos: William L. High)

Use As a Third Wire Winch

The Bureau of Commercial Fisheries has modified the trawl net reel aboard its research vessel John N. Cobb to work also as a constant tension third wire winch in which the tension is varied manually. This third wire system also allows an electrical core wire to be linked with the trawl for various applications. The reel hydraulic power supply has a bypass system operating in parallel to the reel's normal hydraulic system (Fig. 4). A controllable relief valve is installed in the bypass to regulate tension to the desired magnitude. As the tension changes from that selected at the control valve, the reel automatically winds in or out to take in slack or pay out cable, thus maintaining the proper balance. A selector valve is operated to return the reel to its net-handling function.

The John N. Cobb's constant tension net reel has been used as an additional towing point for an experimental 8-bridle midwater trawl. Thirty-fathom bridles from the center headrope and footrope were joined to a single cable wound onto the net reel (Fig. 5). The distribution of towing strain could be altered between the two main trawl cables and the third wire by a simple adjustment of the hydraulic pressure relief valve (Fig. 6).

By installing a single electromechanical towing cable on the reel, the system was easily used to place a third wire depth telemetry system on a midwater trawl. The third wire system eliminates the need for underwater connectors to pass telemetry beyond the otter board to the trawl. Also, it allows use of conventional trawl cable on port and starboard tow points. This results in lower installation costs of telemetry equipment.

Stern Rollers

Trawlers with net reels soon found that a stern rail roller was a valuable addition. About 80 percent of the Pacific Northwest trawlers that have net reels also use a stern rail roller. It greatly reduces chaffing and wear to web and groundlines as they slide over the stern. Rollers are constructed of 8- to 10-inch steel pipe. The length of the rolling surface depends on the vessel and net reel width, but it usually equals the full width of the net reel (Fig. 6). Bearings at each end allow the roller to rotate freely. A portion of the rail is cut away to install the roller nearly flush with the rail top.

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## BUSY DAY CANAPES

- 1 jar (12 ounces) herring in sour cream
- 1 large cucumber
- 2 teaspoons salt
- 3 cups ice water
- 1 loaf (8 ounces) party rye bread
- 2 tablespoons butter or margarine, softened
- Paprika

Wash cucumber. Score cucumber by running a sharp-tined fork down the length of the cucumber from end to end. Cut crosswise into very thin slices. Place in a bowl of salted ice water and let stand 30 minutes to crisp. Drain on absorbent paper. Spread bread with butter. Overlap 2 slices cucumber on each slice of bread. Top cucumber with 1 large or 2 small pieces of herring. Sprinkle with paprika. Makes approximately 24 canapes.

This idea for entertaining is from a 22-page, full color booklet, "Nautical Notions for Nibbling," released by the United States Department of the Interior's BCF. It is available for 45¢ from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10 (catalog no. I-49.49/2:10).

# SAFETY FOR THE COMMERCIAL FISHING VESSEL AND CREW

By John J. Murray*

In 1959, BCF initiated a Fishing Vessel Safety Program for the New England commercial fishing fleet to reduce the accident-frequency rate of crews--and the cost of marine insurance premiums to vessel operators.

The program has concentrated on the major fishing ports of the region--Boston, New Bedford, and Gloucester, in Massachusetts, and Portland, Maine.

Marine insurance always has been and undoubtedly will continue to be expensive. To most fishing-vessel owners, insurance premium costs are the third largest operating item, ranking after wages and fuel. Steadily increasing settlements for claims resulting from personal injury or loss of life have produced corresponding increases in costs of protection and indemnity (liability) coverage. This situation is particularly acute in the New England and North Atlantic areas, where protection and indemnity loss experience has been worse than hull loss experience.

Insurance costs for fishing vessels are based mainly on the vessel's seaworthiness, how well its equipment has been maintained, the owner's operating record, and the craft's loss experience. The insurance premiums are substantial. Often, they represent the difference between profit or loss for the owners on an annual basis.

Insurance is the only one of these three costs susceptible to direct control through a safety program that will detect and correct unsafe conditions and practices.

## Insurer Sets Rates

Marine insurance rates are not regulated by state insurance authorities. The rate to a vessel is determined by the insurance company, which weighs certain variables in arriving at it. Hull insurance premiums are based on a percentage of the vessel's appraised value determined by the insurer. For example, if a vessel appraised at \$100,000 is accorded a 4% rate, the owner is assessed a \$4,000 annual premium. Vessel age is a major factor in setting this rate. There is a widespread difference between hull insurance premiums for representative vessels over 10 years old and those not over 5:

Table 1 - Hull Insurance Premiums for Certain New England Commercial Fishing Vessels

| Vessel | Built | Appraised Value | Annual Premium | Rate Percent | Cost Per \$1,000 Valuation |
|---|---|---|---|---|---|
| Vessels Over 10 Years Old | | | | | |
| | | \$ | \$ | % | \$ |
| "A" | 1944 | 60,000 | 3,300 | 5.5 | 55 |
| "B" | 1949 | 20,000 | 1,600 | 8 | 80 |
| "C" | 1929 | 22,000 | 1,980 | 9 | 90 |
| "D" | 1949 | 35,000 | 3,150 | 9 | 90 |
| "E" | 1944 | 25,000 | 2,500 | 10 | 100 |
| | | Average Rate | | 8.3 | |
| Vessels Under 10 Years Old | | | | | |
| "A" | 1962 | 80,000 | 3,200 | 4 | 40 |
| "B" | 1963 | 50,000 | 1,750 | 3.5 | 35 |
| "C" | 1963 | 125,000 | 6,625 | 5.3 | 53 |
| "D" | 1958 | 125,000 | 6,250 | 5 | 50 |
| "E" | 1960 | 100,000 | 4,000 | 4 | 40 |
| | | Average Rate | | 4.3 | |

Fig. 1 - New Bedford scalloper built in 1936. Vessels of this age invariably face low appraisal values and high insurance rates. (Photo: Robert K. Brigham)

*Regional Safety Officer, BCF, Gloucester, Mass.

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Fig. 2 - New Bedford scalloper built in 1966. Such vessels enjoy high appraisal values and reduced insurance rates.

All these vessels are medium-size otter trawlers or scallop dredgers fishing the same areas under similar conditions throughout the year. The major variant is age.

Personal Injury

Protection and indemnity (liability) coverage for claims arising from personal injury to crew members is increasingly expensive to the vessel operator. Claim awards in the New England area have increased greatly, with correspondingly higher premiums.

Protection and indemnity rates are set on a per-capita/per-annum basis for each vessel. For example, an owner who operates a vessel with 10 men may pay $600 per man, or $6,000 annually, for this protection. It is customary to provide this insurance for all crew members, but records show instances where certain men are specifically excepted. This is noted generally on family-owned vessels where relatives of the owner or owner-captain are excluded from protection and indemnity benefits. This practice reduces the initial cost to the owner, but often it results in serious legal and financial trouble when an uninsured fisherman suffers a major shipboard injury.

While vessel age plays a part in setting premiums for protection and indemnity coverage, it is less than that in hull coverage. The role of vessel age in protection and indemnity costs for similar vessels is shown in table 2.

Table 2 - Comparative Protection and Indemnity Costs for Vessels of Different Ages

| Vessel | Year Built | Limit of Liability | Number of Crew Men | Annual Cost Per Man |
|---|---|---|---|---|
| | | $ | | $ |
| "A" | 1965 | 300,000 | 5 | 275 |
| "B" | 1963 | 300,000 | 6 | 340 |
| "C" | 1938 | 300,000 | 9 | 555 |

Previous loss experience, maintenance standards, character and reputation of the vessel's captain and owner--all influence the insurer at rate-setting time.

Causes of Accidents

BCF has learned much about the nature and causes of shipboard accidents. About 80 of every 100 shipboard accidents are personal injuries. A BCF study of 385 personal injuries over a 4-year period shows:

| Cause | Number | Percent |
|---|---|---|
| Falls-- | | |
| On deck . . . . . . . . | 96 | 23 |
| Elsewhere . . . . . . . | 19 | 7 |
| Hit by objects . . . . . . | 86 | 20 |
| Hit by sea . . . . . . . . | 29 | 8 |
| Trawl winch operation | | - |
| injuries . . . . . . . . | 22 | 8 |
| Hand injuries . . . . . . | 16 | 4 |

The remaining 32 percent includes knife wounds, fish bones in hands, burns, eye injuries, etc.

Nearly 75 percent of the claims stemming from these accidents is less than $350 per claimant. This large percentage of petty claims is important in setting the level of annual insurance costs to vessel owners.

BCF Recommendations

BCF acted to reduce accidents caused mainly by unsafe conditions. Its Safety Unit strongly urged adoption of the following measures to reduce falling accidents:

1. Instal skid-resistant bridge flooring on deck, winch platform, companionway ladders, and engineroom floors. This measure has been highly successful and widely adopted by the industry.

2. Provide and rig life lines stretching from forecastle aft to breakdeck for use during heavy weather.

3. Instal protective guard rails around deck bollards and in front of trawl winches.

4. Practice good housekeeping to prevent oil and fuel leaks on deck.

5. Provide ladders for boarding and debarking from moored vessels.

The response to these recommendations has been excellent; probably the best results noted were the installation of skid-resistant material on vessel decks. This is now common practice on most small and medium-size vessels.

The need for fishermen to wear safety hats while unloading fish has been stressed. The initial response to this recommendation was the presentation by the Seafood Producers' Association of New Bedford, Mass., of 100 safety hats to local stevedores. While not all 100 hats can be seen today, a fair amount is worn by New Bedford, Gloucester, and Boston fishermen.

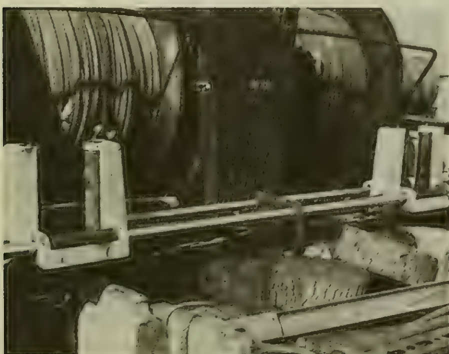


Fig. 3 - Level wire winder on trawling winch of large otter trawler. Winder is operated by winch men and eliminates hazardous operation by fishermen in front of winch.

Fig. 4 - Hand steering wire on trawling winch, the cause of many injuries in otter trawling fleet.

To reduce the hazards of trawl winch operations, installation of level wire winders has been urged particularly in manually steering trawl wire on the drums. Adoption of this measure has been moderately good--mostly confined to newer vessels in the large otter trawl class.

Marine Safety Messages

In 1961, BCF initiated a series of vessel safety bulletins pointing out hazards and potential accident sources and recommending corrective measures.

The messages were circulated widely. Radio Stations WBSM, New Bedford, WESX, Salem, and WHDH, Boston, broadcast the bulletins along with daily fishing information programs. Copies also were mailed to fishing vessel owners and operators and to all newspapers in the major fishing ports. The papers carried the bulletins in their waterfront news columns.

Between January 1961 and October 1967, 23 safety messages were issued to the fishing industry. They covered such subjects as: installation of ladders on scallop booms; annual inspection of dories and lifesaving equipment; annual inspection of fire-fighting equipment; measures to reduce number of shipboard falls; low reaction of wooden vessels to radar detection; annual inspection of overhead rigging; measures to prevent collisions at sea; annual inspection of inflatable life rafts; handling explosives snagged in fishing gear; obtaining medical aid; and other subjects.

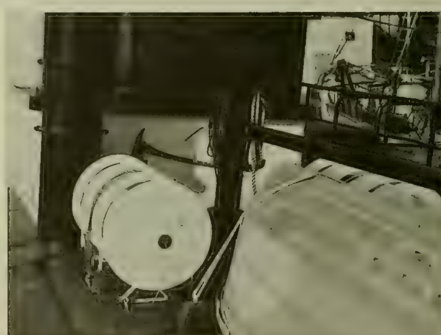


Fig. 5 - Inflatable life raft for 15 men stowed on deck of Boston-based large otter trawler. It is fitted with hydrostatic release mechanism. (Photos: J. J. Murray)

Safety Equipment Demonstrations

Another effective phase of the work has been practical dockside demonstrations of approved marine safety equipment to vessel owners. Displays in trade association halls and marine insurance company offices ranged from 10-man inflatable life rafts to vest-pocket emergency distress flare kits.

In cooperation with the U. S. Coast Guard, the emergency dewatering pump unit used to assist fishing vessels in search-and-rescue operations figured prominently in the demonstrations.

Safety applicances displayed included: emergency dewatering pumps - first aid fire extinguishers, radar targets for use by wooden vessels, safety hats and boots, fire detection and alarm systems, distress and identification signals, and skid-resistant decking material.

Fig. 6 - Demonstration of inflatable life raft to fishing vessel owners at New Bedford, Mass. (Photos: J. J. Murray)

Fig. 7 - Guard rail on forecastle head fully protects fishermen working in this exposed position.

Fig. 8 - Absence of guard rail is hazard on forecastle head of medium otter trawler.

Fig. 9 - Guard around deck bollard of Boston large otter trawler. This safety device is mandatory on European distant-water trawlers. It has recently gained acceptance in U. S.

Results have been encouraging. The adoption by the fleet of these devices has been widespread. In the past 3 years, over 150 pieces of marine safety equipment have been installed on New Bedford vessels alone.

Fishermen's Training Program

BCF worked closely with the U. S. Department of Labor in the planning, instruction, and successful completion of 12 on-the-job fishermen training courses in Boston, Gloucester, and New Bedford.

The program aimed at training men for the fisheries. Since it began in 1965, it has added

about 88 men to the fleet. On-the-job safety was stressed in all courses. The dual objectives were to alert trainees to the hazards and dangers of commercial fishing--and to eliminate shipboard accidents.

During 7 training periods--from August 1965 in Boston to November 1967 in New Bedford--instructors from BCF's Fishing Vessel Safety Unit devoted over 100 hours to teaching the fundamentals of marine safety.

The value of the safety instruction was best illustrated by the nearly accident-free record of the trainees during their work aboard the vessels.

Fig. 10 - Author instructing trainees in steering trawl wire on trawl winch at New Bedford. (Photo: Robert K. Brigham)

Further Aid to Fleet

BCF also has worked closely with industry in sponsoring other safety activities. For example, when the revised "International Rules of the Road" were slated to become effective on Sept. 1, 1965, there was some confusion about the possible effect on fishing operations. In cooperation with the U. S. Coast Guard, BCF's Safety Unit documented the rule changes affecting commercial fishing vessels in a safety bulletin and a pamphlet. The publications, which presented a simplified version of selected "International Rules" most important to fishermen, were distributed to U. S. and foreign operators. Over 5,000 copies of the bulletin and 10,000 of the pamphlet were issued.

In September 1967, BCF's Regional Safety Officer issued a bulletin outlining the newly established "Sea Lanes" for vessels entering or departing New York Harbor; 200 copies were sent to vessel owners. This information is extremely important to vessels fishing or traversing this area, especially during low visibility.

The most recent safety message gives the location of the platform of Texas Tower #2 that foundered on the northern edge of Georges Bank in October 1963. Fishing vessels have reported fouling the structure and suffering substantial loss and damage to their fishing gear.

In cooperation with the U. S. Public Health Service, a bulletin listing the procedure for obtaining medical advice for injured or ill fishermen was prepared and distributed to vessel operators on the Atlantic Coast and Gulf of Mexico, from Maine to Texas. About 500 bulletins were distributed in the New England area.

A project underway involves the use of identification banners for fishing vessels requiring assistance at sea. Use of these banners is advocated by the Coast Guard, which reports the problem of identifying fishing vessels in distress and awaiting assistance on the fishing banks.

In May 1967, the Coast Guard accorded official recognition to the Canadian small craft-to-air distress identification signal. This consists of a 72- by 45-inch, fluorescent, orange-red, cloth panel bearing an 18-inch black square and 18-inch black circle, 18 inches apart, on the flag's major axis. A

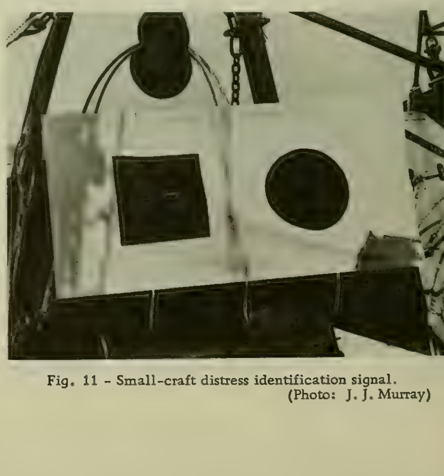


Fig. 11 - Small-craft distress identification signal. (Photo: J. J. Murray)

Fig. 12 - Emergency dewatering pump used by Search-and-Rescue Division of U. S. Coast Guard in assisting sinking fishing vessels. Gasoline-operated pump is packed in steel drum with intake and discharge hoses and lowered from helicopter or parachuted. (Photos 12, 14: J. J. Murray)

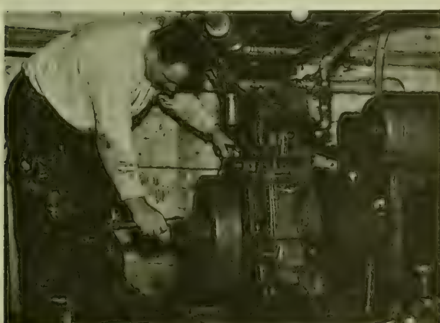


Fig. 13 - Unsafe conditions in engineroom of fishing trawler. Cramped quarters for starting generating unit, unguarded V belts, naked light bulb, and poor housekeeping create extreme hazards.

BCF safety message has recommended this signal to U. S. fishermen and vessel operators.

Currently, a photo identification file of all documented fishing vessels in the First Coast Guard District is being compiled for the Coast Guard Search and Rescue Branch. The file will include information on physical characteristics, fishing methods, and areas normally worked.

This is a facsimile of information card attached to each photo:

| | |
|---|---|
| VESSEL: Pelican | OFFICIAL NO.: 254 482 |
| PORT: Boston | FISHERY: Otter Trawl |
| OWNER: John B. Doe, 18 South St., Boston, Mass. 02210 | |
| TONNAGE: GROSS 138 | NET: 65 |
| CONSTRUCTION: Wood | |
| DIMENSIONS: LENGTH: 90 BREADTH: 21 DEPTH: 10 | |
| FISHING AREAS: Georges Bank - South Channel | |

## Federal Regulations

Commercial fishing vessels are subject to navigation and inspection laws stated in "Rules and Regulations for Uninspected Vessels," Coast Guard pamphlet CG 258. These requirements cover navigation lights and shapes, whistles, fog horns and fog sound signal devices, life preservers and other lifesaving equipment, fire extinguishing equipment, carburetor flame arresters for gasoline engines and ventilation rules for tanks and engine spaces. Requirements concerning lights and sound signal devices are primarily concerned with insuring proper navigation and identification of the type of vessel to reduce risk of collision.

Fig. 14 - Safety ladder on boom of New Bedford scallop dredger.

The documented fishing vessels of 200 gross tons and up are subject to more requirements of licensing deck and engineroom personnel.

The absence of any regulations concerning the installation, certification, or inspection of lifeboats, life floats, and similar debarking equipment is a serious gap in the safety standards of the fishing fleet. Examination of the

requirements for uninspected vessels reveals that the sole safety items required by a commercial fishing vessel are life preservers and fire extinguishers.

SUGGESTED INDUSTRY SAFETY PROGRAM FOR NEW ENGLAND COMMERCIAL FISHING VESSELS

The problem of safety is not a simple one. The objective of industry safety committees of owners and crews should be to recognize the areas of major importance and to set standards and guide lines for the consideration of all industry groups.

Some fundamental measures that should be considered are:

1. Form industry advisory groups in all major fishing areas. The group should include representatives of fishermen, owners, and insurers. They should advise industry and Federal agencies on safety of fishermen and fleet.

2. Establish standards for lifeboats and dories used for lifesaving purposes. Standards should cover installation, certification, and inspection of all boats or rafts used for survival purposes. Also, standards for launching equipment and provision for semiannual launching drills.

3. Incorporate approved marine safety measures in all newly constructed vessels--non-skid decking, bollard guards, engine-room color coding, fire detection and alarm system, deck-located shut-off valve for main engine, metal covers over trawl wires leading from forward deck bollards to gallows base, dual bilge pumping lines, and self-contained water pump for emergency.

4. Equip selected vessels with emergency water pumps as stand-by equipment for transfer to distressed vessels on fishing grounds.

5. Cooperate with local fire departments to conduct annual fire prevention and fire protection survey of all vessels.

Basically, prevention of shipboard accidents is a matter for owner and crew. Information on marine safety from insurance companies, Federal agencies, and engineering firms is useless unless owners and crews cooperate and act on this advice. They should establish safety or loss-prevention units in all major fishing ports. Also important is an accident-reporting system in which all vessels can furnish accident reports. These data are essential to establish accident frequency rates--and to evaluate the program's effectiveness.

FISH DUST ELIMINATED

Sawdust is usually a negligible loss, but when the dust comes from sawing frozen fish for fish sticks, the waste means considerable cost.

A heat treatment developed by the British Ministry of Technology's Torrey Research Station in Aberdeen, Scotland, eliminates the sawdust problem. The fish slabs, about an inch and a half thick, are placed between heated platens and brought quickly to $12^{\circ}$ F. In that condition, they can be chopped without waste.

Before the new technique was developed, the fish had to be warmed gradually for 48 hours, and losses occurred from soft fish flaking off from the edges. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966 by Science Service, Inc.)

# INTERNATIONAL

## Soviets and Poles to Buy Danish Propulsion Engines

Several executives and technicians of Burmeister and Wain Motors (B & W), Copenhagen, Denmark, visited Poland early in April to introduce new 1968 B & W marine engines for fishing and other vessels. B & W began a sales campaign in Copenhagen in February 1968 for West European buyers. The Polish sales campaign results from a licensing agreement B & W has with a Polish state-owned ship-building firm since 1959. In 1967 alone, 17 propulsion engines totaling 205,000 hp. were built in Poland under licensing arrangements with B & W. On Jan. 1, 1968, the licensing agreement was transferred to the Cegielski machine plant in Poznan. Besides Cegielski, such engines are produced by Gdansk Shipyards.

Also A Soviet Market

B & W was scheduled to extend its sales campaign in March 1968 to the Soviet Union, where the "explosive growth of the Soviet commercial fishing fleets created a large demand for propulsion engines." The demand excited Danish businessmen. ("Børsen," April 3, 1968; reported by Regional Fisheries Attaché, Copenhagen.)

## Japan-USSR Northwest Pacific Talks End

The 12th Annual Meeting of the Japan-USSR Northwest Pacific Fisheries Commission was held in Moscow beginning March 1, 1968. It ended on April 26 after 56 days of discussion.

On April 25, agreement was reached to set the 1968 Japanese salmon catch quota in the Convention waters at 93,000 metric tons--46,500 tons each for Area A (north of 45° N. latitude) and Area B (south of 45° N. latitude); a 10-percent catch was allowed for Area B. The 1968 catch quota is 3,000 tons less than the 1966 quota, the previous lean year for pink salmon.

Soviets Accept With Conditions

The Soviet negotiators had demanded a salmon catch reduction of 87,000-88,000 tons. Finally, they accepted the 93,000-ton-quota on condition that Japan agree to the 2-week suspension of fishing in Area A and to shortening the season, as was done in 1966 and 1967.

On April 26, agreement was reached on regulation of the salmon, herring, and bottomfish fisheries, and crab fishing off Cape Olyutorski.

King Crab Agreement

The deadlock over king crab fishing in the northwestern Pacific was broken on April 18. Under a new agreement, Japan will operate this year 4 crab fleets in the Okhotsk Sea off western Kamchatka Peninsula, and the Soviet Union will operate 8 fleets. Crab production quota was set at 224,000 cases for Japan, and 432,000 cases for the Soviet Union--a total of 656,000 cases (48 $\frac{1}{2}$-lb. cans).

The Japanese crab fleet had left Japan April 8 for the fishing grounds. Since April 15, when the season normally opens, it waited for instructions. On April 18, it received the green light.

Compromises Reached

At the crab talks, the controversial Soviet proclamation of the Continental Shelf was finally shelved. Both nations sought a practical solution to enable their fleets to begin operations. The Japanese also agreed to impose voluntary fleet reduction in the crab fishery off eastern Sakhalin Island. Crab fishing off Cape Olyutorski was to be discussed at a later date. ("Suisancho Nippo," Apr. 19, 1968, "Suisan Tsushin," Apr. 27, 1968.)

## Japanese Seek to Negotiate Mauritania's 12-Mile Limit

The Japan Distant-water Trawlers Association invited the Mauritanian Agriculture Minister to visit Japan in May 1968. The purpose was to solicit the Minister's view on a bilateral agreement to permit Japanese fishing inside Mauritania's 12-mile exclusive fishing zone.

Mission to Mauritania

In summer 1967, the Association sent a mission to Mauritania for preliminary talks. Later, it offered to cooperate in building and operating cold storages--and in experimental fishing for Mauritania. In exchange, it asked for the right to fish within the retricted zone. The proposal was stalled by Mauritania's silence.

The Japanese Fisheries Agency also sounded out Mauritania on opening government-level talks in May 1968. As of mid-April, it had no response.

Restraint Urged on Trawlers

In view of the preparations for talks, the Trawlers Association urged restraint on its member vessels to avoid irritating West African coastal countries. ("Shin Suisan Shimbum," Apr. 22, and "Minato Shimbun," Apr. 18, 1968.)

## U. S. Joins Indian Ocean Fishery Commission

The U. S. became an official member of the Indian Ocean Fishery Commission (IOFC) on April 8, 1968. IOFC's first session is planned for Sept. 1968.

The Commission was formed following a recommendation of the 48th Session of the FAO Council in June 1967. Its purpose is to develop and use the Indian Ocean area's fishery resources. (U. S. Embassy, Rome, April 11, 1968.)

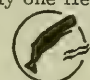
## 1967/68 Antarctic Whale Catch

The "Norwegian Whaling Gazette," Mar.-Apr. 1968 issue, reported the 1967/68 whale catch in the Antarctic:

| Expedition | Catch of Blue Whale Units | Production in Barrels | | | Material | |
|---|---|---|---|---|---|---|
| | | Whale Oil | Sperm Oil | Total Oil | Floating Factories | Catchers |
| Norway: | | | | | | |
| 1967 | 292 | 31,720 | 2,520 | 34,240 | 1 | 5 |
| 1966 | 801 | 79,500 | 26,500 | 106,000 | 2 | - |
| Japan: | | | | | | |
| 1967 | 1,493 | 171,400 | 4,411 | 175,811 | 4 | 43 |
| 1966 | 1,633 | 182,623 | 11,754 | 194,379 | 4 | - |
| USSR: | | | | | | |
| 1967 | 1,016 | 1/ | 1/ | 1/ | 3 | 49 |
| 1966 | 1,069 | 1/ | 1/ | 1/ | 3 | - |
| Total: | | | | | | |
| 1967 | 2,801 | 1/ | 1/ | 1/ | 8 | 97 |
| 1966 | 3,503 | 1/ | 1/ | 1/ | 9 | - |

1/Not available.

As in the last two seasons, sei whales comprised the bulk of the catch. In the 1967/68 season, 8 floating factories with 97 catcher boats were operated. This was one factoryship less than the previous year; the Norwegians sent only one fleet this season.



## Canadian Conference on Fishing Vessel Construction Materials

Jan-Olof Traung, Chief of the Fishing Vessel Section of FAO, will discuss new thinking on the use of materials for building fishing vessels at a Canadian conference in Montreal, Oct. 1-3, 1968. He will provide the keynote for more than 30 papers by Canadian and world experts.

The Conference on Fishing Vessel Construction Materials is sponsored by Canada's Federal-Provincial Atlantic Fisheries Committeee.

Many Speakers & Subjects

The conference will hear the views of Canadian naval architects, boatbuilders, materials suppliers, fishing vessel operators, and government specialists--and of specialists from the U. S., Japan, South Africa, and the leading European fishing nations. The speakers will discuss significant developments and

trends in the use of traditional and newer materials. These will include steel, wood, plywood, laminated wood, resin and glues, single-skin and cored plastics, and concrete.

Construction Techniques

Construction techniques will be the subject of several papers. Comparative assessments of the various materials and their economic possibilities will be submitted at the final session. The views of the fishing industry on the materials for future vessels also will be presented. (Canadian Department of Fisheries, Apr. 30, 1968.)

## Japan to Build Fish Harbor in East Pakistan

The East Pakistan Fisheries Development Corp. (EPFDC) and Mitsui and Co. of Japan agreed April 19 on the construction of a fish harbor in the Sadarghat area of Chittagong (between 22°35' and 22°49' N. latitude and between 91°27' and 90°22' E. longitude). Construction costs will be about US$6.9 million. Foreign exchange costs are reported to be equivalent to US$2.56 million, financed by a Japanese yen credit to Pakistan.

The contract calls for completion of the project within 21 months of the April 19 signing. And, when completed, the fish harbor will provide berthing facilities for 68 seagoing trawlers capable of handling 76,000 metric tons of sea fish annually. Reportedly, preliminary work has begun on a 110-acre plot of land.

Harbor Long Planned

Pakistan has considered construction of a fish harbor for Chittagong since the Second Plan Period. Until now, however, lack of financing, and disagreement within the Government of East Pakistan over a site, have delayed the project. It was finally approved by the Executive Committee of the National Economic Council on Aug. 30, 1967.

This agreement with a Japanese firm follows a recent Japanese shrimp-purchasing team's visit to East Pakistan. The aggressive efforts of the Japanese would seem to point to a concerted effort to gain a foothold in Pakistan's fisheries industry. This is particularly true of shrimp exports which, until now, have gone largely to the U. S. (U. S. Consul, Dacca, Apr. 24, 1968.)

## Norwegians and Danes Disagree Over Salmon Fishing

Norwegian anger over Danish salmon fishing continues. The Norwegians claim research has established that salmon fished in international waters off Norway are either on their way to the coast to spawn or are young fish that will not spawn until 1 or 2 years later.

Norwegians claim that Danish and Swedish fishermen reap the benefit of extensive cultivation work and conservation regulations carried out by Norwegians. The Norwegians say the Danes have doubled their salmon fleet this year, which means an even heavier exploitation of northern salmon stocks.

The Danish View

Denmark says fishing off the north Norway coast is legal; the fleet has not doubled but actually decreased; Danes adhere to international regulations on minimum size; they fish 200 nautical miles from the coast, even though fishing as close as 12 miles would be legal.

The Danish view is that the Norwegians want as many salmon as possible to enter their lakes and rivers so fishing rights can be leased to wealthy foreigners.

There has been no indication of any steps toward negotiation of an international agreement to regulate salmon fishing off the Norwegian coast. (U. S. Embassy, Copenhagen, Apr. 26, 1968.)

# FOREIGN

## CANADA

### COHO SALMON INVESTIGATIONS UNDERWAY

The 1968 coho salmon investigation program in Juan de Fuca Strait resumed on May 1. This program was started in 1967 by the Department of Fisheries to define migratory behavior relative to abundance and feeding habits of early season coho. Information also will be obtained on effort-distribution data for sport and commercial fisheries in the Victoria-Juan de Fuca region.

The 1968 program has 2 parts: During May 1-July 1 in Area 20, the chartered commercial vessel "K Charles" will be tagging "blueback" coho in Sooke and Pedder Bay region; May 1-July 15 in Becher Bay to Glacier Point, and from Sombrio Point to Port San Juan a troll sampling survey by the chartered commercial trollers "Valiant I" and "Tidewater III."

The Department will use weekly flights between May 15 and Sept. 30 to obtain information on distribution of sport and commercial gear.

#### Reward for Returned Tags

Much of the success in a tagging program depends on the return of recovered tags. A one-dollar reward is offered for all tags returned to a Fishery Officer, or mailed to Regional Headquarters, Department of Fisheries, 1155 Robson Street, Vancouver 5, B. C., Canada. (Department of Fisheries, Canada, Apr. 30, 1968.)

* * *

### GOVERNMENT AND INDUSTRY SPONSOR MARKET STUDY

A detailed research study of the Canadian domestic market for fishery products will start soon. The 2-year $200,000 study will be financed jointly by Federal and provincial governments and the fishing industry.

The Fisheries Council of Canada, which proposed the study on industry's behalf, will put up C$50,000, the Federal Government C$75,000, and the participating provinces the remaining C$75,000. To date, 8 provinces are supporting the project, one is considering it, and one is delaying action to see the outcome of efforts to set up a prairie fish-marketing organization.

#### Study's Purpose

The purpose of the market study is to secure information on which the industry may base future promotional efforts to improve sales in Canada. A firm of consultants will conduct the study.

* * *

### SUMMARY OF 1967 MARINE-OIL SITUATION

Canada's marine oil production in 1967 totaled 64.1 million pounds, 9.8 percent higher than in 1966. There was a sharp drop in herring oil production in British Columbia because herring were less abundant than in former years. However, production in the Atlantic Coast expanded more than enough to offset the decline in the west.

The United Kingdom, a major marine-oil market in earlier years, returned to the market in 1967. The U. K. took 4,189,200 pounds of herring oil.

Shipments of whale oil jumped from 1.4 to 12.5 million pounds in 1967. Major markets were the Netherlands, United Kingdom, and Italy.

#### Marine Oil Imports

Imports of marine oil declined from 10.2 million pounds in 1966 to 7.9 million in 1967. Shipments from the U. S. declined to 1.2 million pounds from 3.1 million in 1966. (U. S. Embassy, Ottawa, Apr. 19, 1968.)

# EUROPE

## USSR

### TO BUILD OR BUY STERN FACTORY TRAWLERS INTO 1970s

In the early 1960s, the Soviet Union ordered 65 large stern factory trawlers of the "Tropik" class from East German shipyards. The Ministry of Fisheries, through state-owned import firm SUDOIMPORT, ordered 21 more Tropik vessels--while East German shipyards were finishing designs for an even more modern "Atlantik" class. The latter has more horsepower, greater fish processing capacity, and larger holds.

The Atlantik Class

The first Atlantik-class vessel was delivered to the Soviets July 7, 1966; the 86th and last Tropik on Nov. 7, 1966, for the anniversary of the October Revolution.

A delay in further delivery of Atlantiks was caused by a temporary Soviet refusal to accept this class because of technical problems. When these were solved, East Germany produced and delivered to the USSR about 25 Atlantiks during 1967. Rate of production will increase to 30 vessels per year by 1970, when the last, 103rd, Soviet-ordered Atlantik will be launched. ("Seeverkehr," May 1967.)

The first Soviet-bought, Atlantik-class vessel began fishing in the Northeast Pacific off U. S. coasts in November 1968; on Georges Bank in the Northwest Atlantic in January 1968. Other vessels of this class operate in the South Atlantic and off California.

E. Germans Build Own

There is some indication that the East Germans are beginning to construct more fishing vessels for themselves. The former's shipyards are achieving great capacity. After 1970, East Germany may launch a second wave of southward fisheries expansion. The first, launched in 1967, reached waters off the U. S. in mid-summer of that year.

* * *

### PROMOTES FISHERMEN TRAINING ON HIGH SEAS

The first fisheries training vessel was delivered to the Soviets by Burmeister and Wain (B & W) of Copenhagen, Denmark, in early March 1968. The vessel is 103 meters (337.8 feet) long and can accommodate 182 persons, including about 110 fishermen-trainees. A classroom for 25 pupils is located forward on the third deck.

The Soviet stern freezer trawler "Pelengator" was launched in March 1968. Built in a Copenhagen shipyard, she is the first Soviet vessel to be used in high-seas training of fishermen. Four similar vessels will be built. The Pelengator was assigned to the Murmansk Fisheries Administration.
(Photo: Burmeister & Wain, Copenhagen)

B & W is building 4 more similar vessels for the Soviet Ministry of Fisheries. These will bring the total educational capacity to about 550 pupils. (Fisheries Attaché, U. S. Embassy, Copenhagen, Apr. 9, 1968.)

14 Delivered by April 1968

Essentially, the training vessels are large freezer stern trawlers, which the Soviets have been ordering from B & W for several years. Fourteen had been delivered by April 1968; 7 more are on order. It is assumed the Danish-made training vessels will emphasize fishing gear and techniques.

The training for fish processors will begin aboard a recently launched, diesel-powered, refrigerated fish carrier of 9,000-displacement tons built in a Soviet shipyard. The carrier is equipped with laboratories and classrooms to train fish-processors, vessel navigators, and engine mechanics. ("Moscow News," Apr. 13, 1968.)

USSR (Contd.):

"Learning While Working"

The Soviets always have been strongly inclined toward "learning while working." Under Khrushchev, each student had to spend some time working as an industrial or agricultural laborer. Apparently, the Soviets have decided to go into high-seas fishermen's training on a large scale. This also may help the Soviets, conveniently and relatively inexpensively, to train the fishermen of foreign countries to which the USSR sells fishing vessels or extends technical assistance.

* * *

## SPACE SATELLITES WILL BE USED TO AID FISHING AND STUDY OCEANS

On March 27, 1968, "Izvestiia," the Soviet Government's official organ, discussed the practical uses of Soviet spacecraft. It mentioned surveys of ice formations, warnings of coming storms, providing information for hydrometeorological services, and other uses.

The article mentions sputniks as being of use to the fishing fleets: "Kosmos-206" already has transmitted to earth data on severe cyclones in the Indian and Atlantic Oceans. Such information is used successfully in plotting a vessel's course. The sputniks also help to select the optimal course for many Soviet fishing and merchant vessels; this permits each vessel to save 5-7 percent of trip time. It affects substantially the economics of vessel operations.

Spacecraft Oceanography Grows

The article was coauthored by the First Deputy of the Soviet Hydrometeorological Service and a Soviet professor. It added to information from another Soviet source that referred to the use of spacecraft oceanography: "Oceanographers help Soviet fishermen and others who exploit marine resources by using the latest equipment--earth satellites and aircraft. Much oceanographic research can be done from space. A plane carrying various instruments--a flying marine hydrometeorological observatory--can do much research. It can take surface temperatures and compile a map of various marine environments; waves can be measured directly from the plane and entered into a map of wave patterns, etc. The greatest advantage in doing this research is the speed with which it can be passed on to users--fishermen and merchant seamen."

Research at Leningrad

The work on Soviet spacecraft oceanography is being done by the Leningrad Branch of the Soviet Institute of Oceanography. N. N. Makarenko heads the Laboratory of Aerooceanography. Although some instruments of the Soviet marine hydrometeorological observatory have been in use for years, it will be another 2-3 years before all the instruments will be installed aboard the observatory and be operational.

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## PURSE SEINING OFF U. S. COAST BEGINS

During April 1968 surveillance flights, at least 9 Soviet medium trawlers were sighted south of Long Island (N. Y.) and Block Island (R. I.) in the Northwest Atlantic fully equipped for purse seining. Power blocks and huge seine nets were observed on the stern of each vessel.

In early April, BCF resources management agents aboard a Coast Guard patrol vessel reported sighting a Soviet seiner; this is the first time a seiner was sighted off the U. S. coast and indicates the Soviets are beginning purse seining (for herring) on a bigger scale. By the end of April, 7 Soviet vessels were sighted seining for herring.

Conversions to Purse Seining

The Soviets have been converting medium trawlers for purse seining for more than 1 year. Most work was done in the Kaliningrad Region; ATLANTNIRO and other technical fishery institutes had a major part in developing gear techniques. In the Western Fisheries Administration, close to 100 medium trawlers already have been converted to purse seining--but most fish in the Norwegian Sea, North Sea, and other Northeast Atlantic fishing grounds. According to the Soviets, purse seining is twice as economical as pelagic trawling, mostly because of higher catches by the same number of fishermen.

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USSR (Contd.):

## PARTY PAPER CARRIES CRITICISM OF FISHERIES MINISTRY

The organ of the Central Committee of the Soviet Communist Party has published an attack on the Ministry of Fisheries and other ministries. The attack was made by I. Dudenko, the Party Secretary for the Astrakhan Region. He accused several ministers of responsibility for the sad state of affairs in the Caspian fisheries.

Dudenko reported that catch plans for the famous "kilka" (Caspian sprat) had been set, "on the basis of recommendations of scientific organizations," at not over 300,000-320,000 metric tons annually. Despite this, the Ministry of Fisheries in July 1966 changed the 5-year plan. Without sufficient evidence, it increased the catch plan to 400,000 tons. Dudenko implied political expediency was responsible for the change.

### Volga Sturgeon Hurt

The article also accused the Ministry for Electric Power of having constructed the giant Volgograd (formerly Stalingrad) Hydroelectric Power Plant without regard for sturgeon-spawning areas in the Lower Volga. As a result, naturally spawning schools have shrunk to only about 20 percent of their former numbers. The shore line of the Caspian Sea has advanced up to 25-30 kilometers in the sea, and the level of water surface has decreased by 2.5 meters.

### Volga Pollution

Pollution of the Volga River is another gigantic problem. Dudenko quoted estimates of the annual dumping into the Volga of 200,000 metric tons of crude oil wastes--and about 400,000 tons of acid wastes and other chemicals. Apparently, this is being done despite stringent Soviet regulations against pollutants.

Finally, the Ministry of Fisheries was accused of being so partial to high-seas fisheries expansion that it neglects problems at home in inland fisheries. The Black, Caspian, and Aral Seas, and Baikal Lake form part of these fisheries. ("Ekonomicheskaia Gazeta," Mar. 1968.)

### Sholokhov Attacked Ishkov

During the 23rd Party Congress in 1966, Mikhail Sholokhov, Nobel prizewinner in literature, held Ishkov responsible for the destruction of Black Sea fishery resources.

Undoubtedly, the Ministry of Fisheries is under pressure by conservationists, some politically well connected, to begin paying attention to the severe problems in inland seas, lakes, and rivers.

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## KING CRAB FISHERY IN EASTERN BERING SEA ENDS

The second of the 2 Soviet king crab fleets departed the eastern Bering Sea on May 2, ending the 1968 crab season. The fleet commander aboard the shrimp mothership "Aleksandr Kosarev" notified U. S. authorities of the departure.

Originally, the Soviets intended to fish until June 1968. But, in early April, when a U.S. Bureau of Commercial Fisheries Resource Management Agent boarded 2 motherships, he was informed that fishing was poor and the 2 fleets might leave before June.

The Soviets fished king crab in the eastern Bering Sea from April to July during the 1960/1964 seasons; in 1965, from April to June; and in 1966/67, from March to June.

The 1968 season was the shortest Soviet Bering Sea king crab season--2 instead of the traditional 3 months. Also it was one with the least effort--2 instead of the usual 3 fleets.

### The 1967 Season

In 1967, the Soviets produced 68,590 cases of king crab (each case of 48 $\frac{1}{2}$-lb. cans). This was only 68.6 percent of the annual quota of 100,000 cases allowed under the U. S.-USSR King Crab Agreement of 1967.

A greater number of tangle-nets was set in 1967: 657,000 against 617,000 in 1966. Despite this, the pack was 33.6 percent less than in 1966, when 104,654 cases were produced, about 12 percent below the year's quota of 118,600 cases.

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USSR (Contd.):

## NEW TUNA EXPLORATORY VESSEL

To help its tuna fleets find fish, the Soviet Ministry of Fisheries has added to the Pacific fleet an exploratory and research vessel specifically equipped for tuna scouting.

This vessel, the "Matros," was built in Kiev Shipyard and belongs to the Far Eastern Fisheries Administration. Home port is Vladivostok. Her first voyage will be to the Indian Ocean.

Kiev Shipyard builds medium freezer trawlers of the 700-gross-ton "Maiak" class. Several of these vessels are used for exploratory and research work.

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## NEW FISHERIES TRAINING VESSEL LAUNCHED

On April 30, the Burmeister & Wain's Shipyard in Copenhagen, Denmark, launched the "Kompas" stern freezer trawler for Sudoimport of Moscow, the Soviet vessel-import firm.

The vessel is the 15th in a series of virtually identical vessels for the same owners. The Kompas is like its sistership, the "Pelengator," launched in September 1967. It differs from other vessels of this class by having sleeping quarters and educational facilities for fishery trainees. The Kompas can accommodate 182 persons, including about 110 apprentices.

The vessel's main features are:

| | |
|---|---|
| Length o.a. | 102.7 meters |
| Length b.p. | 91 " |
| Breadth | 16 " |
| Depth to second deck | 8.6 " |
| Deadweight | 2,520 metric tons |
| Draught | 5.6 meters |
| Speed on loaded trials | 14 knots |

### Classrooms and Library

Two classrooms for navigation and radio instruction are on the boat deck. On the third deck, forward, a classroom for general instruction in fishery subjects will hold 25 apprentices. A library also will be provided.

The apprentices will be accommodated in common rooms, the largest having berths for 18 men.

### The Rigging

The rigging consists of 2 pairs of self-supporting derrick posts. The foremost pair is provided with a top mast and a self-supporting, combined, signal and radar mast.

There are four 3-ton and two 7-ton derricks. These are served by four 3-ton and two 5-ton winches. The deck machinery includes one anchor winch, two 3-ton warping winches, and one 15-ton trawl winch. All winches are hydraulic.

The navigational equipment is the newest type. (Burmeister & Wain.)

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## SCIENTISTS LINK SAURY MIGRATIONS TO CYCLONE ACTIVITY

TINRO scientists in Vladivostok are studying the relationship between saury migrations and the activity of cyclones in the North and South Pacific. They noticed that when summer cyclones are intense over the Sea of Okhotsk, saury appear early in the traditional schooling areas. When cyclone activity is intense over the South Pacific, they are "late." Saury also are believed to approach earlier when the ocean's surface layers are warmer; this is a phenomenon closely associated with cyclone activity over the Pacific.

On the basis of these findings, it was possible to forecast saury Pacific fishing 2 months in advance, particularly off the Kuril Islands. ("Tass," April 4, 1968.)

### Study Herring in N. Atlantic

Similar studies involving herring are underway in the North Atlantic. There, a relationship between cyclones and the position of herring schools with respect to water surface has been found. With low atmospheric pressure, the herring dive to greater depths; with high pressure, they come closer to the surface. ("Rybnoe Khoziaistvo," April 1968.)

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## RESEARCH VESSEL VISITS IVORY COAST

On April 21, the Soviet 6,829-displacement-ton oceanographic vessel "Akademik Kurchatov" visited Abidjan, Ivory Coast. The vessel is conducting complex oceanographic studies in the southeast Atlantic between 5° and 23° south latitude for $3\frac{1}{2}$ months.

USSR (Contd.):

During its 4-day stay in Abidjan, she was open to the public for 3 hours each day. Professors from Abidjan University and Ivory Coast Government officials also visited. ("Fraternité-Matin," Abidjan, Apr. 25, 1968.)

## United Kingdom

SEEKS TO EXPORT FISHERY TECHNIQUES

The United Kingdom is seeking to export its technical fisheries knowledge in shipbuilding, engineering, and contracting industries. This means strictly business propositions to interested foreign firms or countries.

The White Fish Authority is embarking on a worldwide publicity program to stimulate business for U. K. firms in these and other aspects of the fishing industry by assisting in the fisheries development of other nations. (U. S. Embassy, London, Mar. 23, 1968.)

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QUEEN SCALLOPS SHIPPED TO U. S.

A shellfish firm in the United Kingdom shipped 5 tons of queen scallops (Chlamys opercularis) to the U. S. early in April. Queen scallops are small scallops found over many areas of the west coast of the U. K. They were not commercialized previously.

The British firm believes that if quality can be maintained in the trans-Atlantic sea shipments, its sales of queen scallops could earn a half-million dollars. ("Fishing News," Apr. 5, 1968.)

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WHITE FISH AUTHORITY RAISES INTEREST ON LOANS

The White Fish Authority announced higher interest rates starting April 1, 1968. The Authority explained that these rates resulted from higher interest rates charged it by the Treasury.

Fishing vessels, new engines, nets and gear:

On loans not over 5 years: $8\frac{1}{8}$ percent, increase $\frac{1}{8}$ percent.

On loans over 5 years, but not over 10 years: 8 percent, no change.

On loans over 10 years, but not more than 15 years: $7\frac{7}{8}$ percent, decrease $\frac{1}{8}$ percent.

On loans over 15 years, but not more than 20 years: $7\frac{7}{8}$ percent, no change.

Processing plants: On loans not over 15 years: $8\frac{1}{2}$ percent, increase $\frac{1}{8}$ percent.

On loans over 15 years, but not over 20 years: $8\frac{1}{2}$ percent, increase $\frac{1}{4}$ percent.

The rates on advances made before April 1 remained the same. ("The Fish Trades Gazette," Apr. 13, 1968.)

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FISHERMEN PRESS NEW FOREIGN LANDINGS BAN

Fishermen's organizations in Grimsby, England, are trying to counter the worst crisis ever faced by British fisheries. Some trawlers have been laid up for a long period; older trawlers are being sold for scrap. If present trends continue, 2,000 fishermen will be unemployed by the end of summer.

Grimsby organizations are preparing a proposal for government assistance and a ban on foreign landings. Support is expected from other fishing ports. Foreign landings are termed "dumping." Many believe that foreigners can land fish in Britain only because their governments subsidize them heavily.

Danes Would Suffer

Danish fishermen would be among hardest hit by a ban--just as they were by unofficial landing restrictions imposed by British trawler-owners in Aug. and Sept. 1967. They protest that, contrary to British opinion, Danish fisheries receive no government subsidy. They contend that the high quality of their cod landed is responsible for excellent demand for cod in British markets.

United Kingdom (Contd.):

Official restriction of foreign landings would run counter to current British policy. This favors free trade in fish products because the domestic industry cannot meet demand. The Danes speculate, however, that British trawler owners who control unloading at some ports are prepared to impose "private" restrictions as in 1967. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, May 7.)

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SUMMARY OF 1967
MARINE OIL SITUATION

Because of the comparative cheapness of marine oils in 1967, imports and use of these oils in the United Kingdom increased considerably. Total imports of marine oils rose almost 60 percent--to 281,900 long tons. However, disposals of marine oils during 1967 did not rise so much. These totaled 226,200 tons, or 13 percent above 1966. As a result of the heavy imports, stocks of marine oils at the end of 1967 reached the very high level of 67,300 tons; it was 28,200 tons a year earlier.

Price Falls Steadily

During 1967, the price of fish oil declined steadily between June and December. It dropped from US$142 per long ton for Peruvian fish oil in June to $103 in December. At the same time in 1966, Peruvian fish oil was $179. By April 1968, the price was way down to $93. The latest quotations for July-August shipments to Rotterdam are $92 a metric ton c.i.f.

U. K. Stocks, Supplies, and Disposals of Crude Marine Oils, 1966-67

| | 1967 | 1966 |
|---|---|---|
| | . . (1,000 Long Tons) . . | |
| Stocks, Jan. 1 | 28.2 | 53.3 |
| Imports | 281.9 | 177.8 |
| Total | 310.1 | 231.1 |
| Disposals | 226.2 | 200.5 |
| Stocks, Dec. 31 | 67.3 | 28.2 |
| Total | 293.5 | 228.7 |
| Balancing item | +16.6 | +2.4 |

(Ministry of Agriculture, "Monthly Digest of Statistics," "Overseas Trade Accounts of the United Kingdom.")

It is reported that large U.K. consumers have bought 16,000 tons of whale oil from this season's catch at $103.20 a ton c.i.f.--compared with $144 per ton paid for 34,500 tons last year. The purchase was made up of 8,000 tons of Soviet and 8,000 tons of Japanese oil. (U. S. Embassy, London, April 19, 1968.)

## France

PLANT TO PRODUCE PROTEIN
FROM PETROLEUM PRODUCTS

A commercial plant to extract protein concentrate from petroleum products is being built at the Lavera refinery in France. It will be operated by British Petroleum of France and is expected to produce 16,000 tons of protein a year by 1970.

Despite all efforts to produce animal protein, says the firm's French research director, the development of only present animal resources would leave a shortage of 10 million tons by 1980 and 22 million tons by the year 2000. Protein production from petroleum should be carefully considered, he suggests.

World Crude Petroleum Output

World production of crude petroleum in 1966 was reported as 1.5 billion tons, about 90 percent paraffinic. Certain paraffins, combined with ammonia, phosphate, and trace metals, are used as a food for yeast. This grows by fermentation into a sufficient mass to be used as livestock feed.

According to the research director, this process represents a potential production of 20 million tons of protein from 40 to 50 million tons of paraffins. ("Science News," Apr. 1968.)

## Sweden

### TO BUILD MORE FISH CARRIERS FOR USSR

Several large orders were placed by Soviet import agencies in Sweden during March 1968. The largest was placed by SUDOIMPORT of Moscow with the Lindholmen shipyard in Gotoborg--for 2 refrigerated fish carriers worth $11-13 million. The cost depends on type of auxiliary equipment to be selected later.

This contract was signed in Moscow on March 14. It supplements a Soviet contract for 6 similar ships awarded Lindholmen in December 1967. All 8 refrigerator vessels are scheduled for delivery before the end of 1970. They are worth almost $50 million.

Perhaps Largest Order

Reportedly, this is the largest order ever booked with Lindholmen. It is expected to secure full employment there at least through 1970. All 8 ships will be powered by "Pielstick" engines of advanced design and equipped with controllable pitch propellers. Some electronic appliances, deck machinery, and galley equipment will be supplied by the USSR.

The vessels will transport frozen fish from Soviet fishing fleets at sea to ports in the USSR. They will contain 12,500 cubic meters of refrigerated space. (U. S. Embassy, Stockholm, Mar. 25, 1968.)

## Norway

### FISH MEAL PRODUCTION TO BE LOWER IN 1968

The 1968 winter herring catch was only 25,600 metric tons--compared with 371,600 tons in 1967. Until a few years ago, the fishery had been No. 1 in volume.

This worst catch since 1889 was due partly to foul weather on the west coast of Norway and partly to sea temperatures that caused the herring shoals to stay below the reach of purse seines. At the end of March, the total catch of all herring species was 39,800 tons, 9.4 percent of the 1967 catch.

Record Catches of Capelin

The failure of the herring fisheries was offset to some extent by record catches of capelin off the coast of Finnmark. The fishery, which ended shortly after Easter, yielded an estimated 485,000 tons, or 20 percent above 1967.

Reduction Plant Output To Drop

There is reason to believe that the output of the reduction plants will be reduced substantially from 1967's record 470,000 tons of fish meal and 310,000 tons of fish oil. The small supplies of high-fat winter herring, combined with a lower-fat capelin this year than in 1967, further indicate that 1968 fish-oil production will decline proportionally more than fish meal.

High Yields Needed

Norsildmel, the joint sales organization of the fish-reduction industry, has sold 300,000 tons of fish meal for 1968 delivery. The 1967 production had been sold before the end of 1967, partly for delivery during the first-quarter 1968. Norsildmel has met all commitments so far this year. But completion of outstanding orders will depend on successful fisheries--notably high yields of North Sea herring and/or mackerel during the rest of 1968.

A possible effect of the winter herring failure could be reduced Norwegian exports to Eastern Europe--where herring meal is preferred over fish meal made from other species. (U. S. Embassy, Oslo, April 17, 1968.)

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### EXPORTS IN FIRST-QUARTER 1968 REPORTED

Norway's fishery-product exports for January-March 1968 were reported on April 25 by "Fiskets Gang," published by the Fishery Directorate:

Frozen Fillets: Exports increased about 14 percent over the 1967 period. Shipments of herring and cod fillets increased significantly.

Canned Fish: Exports were 7,400 metric tons, slightly below comparable 1967 ship-

Norway (Contd.):

ments. Exports of small sild sardines were up about 13 percent; brisling shipments fell 16 percent. The main canning season for brisling and sild sardines begins in spring.

Industrial Fish: Exports rose 15 percent from 1967 period. The large stocks at the start of 1967 contributed to the gain because herring meal production has been extremely low this year.

| Product | Jan.-Mar. | |
|---|---|---|
| | 1968 | 1967 |
| | . . . (Metric Tons) . . . | |
| Frozen fillets: | | |
| Haddock | 3,079 | 1,536 |
| Cod | 8,520 | 5,146 |
| Coalfish | 5,094 | 7,152 |
| Herring | 1,284 | 1,956 |
| Other | 1,518 | 1,278 |
| Total frozen fillets | 19,495 | 17,068 |
| Frozen herring | 1,682 | 3,997 |
| Canned fishery products: | | |
| Brisling | 1,325 | 1,584 |
| Small sild sardines | 4,285 | 3,779 |
| Kippers | 696 | 830 |
| Shellfish | 131 | 149 |
| Other | 967 | 1,111 |
| Total canned fish | 7,404 | 7,453 |
| Fish meal | 133,138 | 115,250 |
| Herring oil, crude | 21,788 | 13,573 |

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## FIRM PRODUCES LOW-FAT, HIGH-PROTEIN FISH MEAL

A/S Nimrod of Egersund, Norway, began production March 15 of low-fat, high-protein, fish meal. The production is based on gasoline extraction of the fat contents of fish meal. This yields a product with a minimum fat content of 0.3 percent and a maximum protein percentage of 88.

The company, situated in Norway's principal fishing port, should be assured ample supplies of raw fish for its planned annual output of 15,000 metric tons of pelletized meal.

### Acceptable for Humans

Most of the production will be marketed as feeding stuff for animals which cannot be fed conventional high-fat fish meal--mink and livestock in months prior to slaughtering. The almost tasteless and colorless Nimrod fish meal also has proved fully acceptable for human consumption. This indicates marketing possibilities in the food industry: low-cost protein enrichment of sausages and fish soups.

### Nimrod Is 2nd Plant

A/S Nimrod is the second Norwegian fat extraction plant for fish meal. The first, a 10,000- to 12,000-metric ton capacity plant, was installed at Kopervik Sildeoljefabrikk, Kopervik in 1967. (U. S. Embassy, Oslo, Mar. 22, 1968.)

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## LATEST EQUIPMENT USED TO SPUR FISH INDUSTRY GROWTH

Norway's fishing industry has had 4 exceptionally good years. Record catches were landed each year after 1962, and the rate of increase in landings was greater than ever before. Landings totaled 1.4 million metric tons in 1962, 2.1 million tons in 1965, and 2.6 million tons in 1966. In 1967, a substantial boost occurred: fishermen supplied processing plants ashore with more than 3 million tons of fish. Norway won fifth place among the world's fishing nations.

The main factors in this achievement were the exceptional amount of fish on the traditional fishing grounds, the generally favorable conditions for fishing, and the use of efficient methods to find and catch fish.

### Efficiency Promoted

During the past few years, a great effort has been made in Norway to promote fishing efficiency. Modern methods have been developed and new gear introduced. A 2-way effect has been observed: The good fishing years have encouraged industry to concentrate talent and energy on developing and marketing new gear; this in turn has greatly increased catches--to the benefit of fishermen and the processing industry ashore.

Many companies have specialized in advanced equipment for the fleet. Norwegian electronic fish-finding devices have met with considerable approval abroad.

Many companies have realized the great importance of vessel maneuverability. They are manufacturing steering propellers--bow or stern thrusters, or the so-called active rudders. Such equipment is now mounted on a growing number of Norwegian and foreign vessels, either fore or astern, or both.

Norway (Contd.):

Improved Fishing Operations

The whole purse-seining operation is guided from the vessel's deck. The power block does the rest; it hauls in far greater quantities in one operation and in less time than manpower did some years ago. Today's big steel purse seiners or trawlers, some even equipped with stabilizers, can fish in weather that was forbidding before.

Resulting directly from such efficient equipment have been North Sea herring and mackerel seasons that rightly were called stupendous adventures.

There are fishing techniques other than purse seining. Net fishing and jig fishing are important for their purposes.

Line fishing has experienced a near revolution after a line-fishing machine was introduced. The machine automatically performs the line's movements upwards and downwards to required depths and speed.

Fishermen also are very interested in trawling. (Export Council of Norway, Apr. 1968.)

## Denmark

HOLDS SUCCESSFUL INTERNATIONAL TRADE FAIR

The sixth International Fisheries Trade Fair was visited by 50,000 people during April 24-May 5. Billed as the largest fair ever held in Europe, it was synchronized with the 100-year jubilee of Esbjerg Harbor.

Products of 250 firms from 13 nations were set up in the new 9,000-square yard auction hall next to the fishing harbor. New vessels produced in East German, Norwegian, and Danish yards were displayed. The exhibit of the Polish import-export agency CENTROMOR included models of their latest trawler designs. Also, the fair displayed processing, handling, and packaging equipment and supplies.

New Fisheries Museum

A special feature was the grand opening of the US$1.7 million Esbjerg fisheries museum. The main attraction was a fully restored 150-year-old fishing boat discovered a year ago beneath tons of beach sand north of Esbjerg. The boat is the type used along Denmark's North Sea coast for centuries. Besides historical displays, the museum shows the operation of modern fishing gear and electronic equipment and North Sea species. There is also laboratory and office space for the Danish Geographic Institute and Denmark's Fisheries and Marine Investigations. (U. S. Embassy, Copenhagen, May 7, 1968.)

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GREENLAND'S FISHERIES ARE IN TROUBLE

The Director of the Royal Greenland Trade Department (RGTD) raised storm warnings for the future of the fisheries at RGTD's annual fisheries meeting in Copenhagen in April. Difficulties face virtually all areas of this major industry. However, there appears no alternative to development of the fisheries as the foundation of Greenland's economy. The Danish Government, he said, must continue to bear the greatest part of the initiative and the larger risks. But he hoped private industry also will continue to assist in the development.

The value of fish purchases during 1967 was almost unchanged from 1966: the RGTD bought raw material worth US$2.6 million, and the private companies bought raw material worth US$1 million.

Cod Fishery Down 6%

The cod fishery, concentrated in May through September, was down 6 percent. The year's smallest cod catches were taken in February, March, and April; results were even poorer than in the 1966 period. This trend continued into spring 1968. The strong seasonality of the cod fishery makes it impossible to secure satisfactory use of processing plant capacity.

Catches of sea catfish (wolffish) increased 9 percent, salmon 2 percent, and shrimp 5 percent. Landings of Greenland halibut declined.

Denmark (Contd.):

New Trawlers in 1969

Catches of the 4 large long-line vessels introduced into the Greenland fisheries by the Government during 1965 and 1966 were down 16 percent in 1967 from 1966. The first of a new series of stern trawlers will be introduced in 1969. It is hoped each new vessel will attain an annual catch of 4,000 to 5,000 metric tons. If this goal is reached, the overall operation of the Greenland fishing industry should become profitable.

Private Firm Loses

The private company, Godthaab Fiskenindustri, lost US$115,000 during 1967; it had earned US$133,000 in 1966. Its raw material purchases were down 10 percent. Losses occurred on its fish meal plant designed primarily for industrial fish--which were in short supply. US$40,000 now is being spent to modify the plant.

Outlook Dim

The RGTD director described to Godthaab Fiskenindustri officials the dim outlook for Greenland fishing. He said the U.S. price of 23 cents a pound for cod blocks was slightly under the cost of production. The Greenland salmon fishery was threatened by overproduction and the resulting price declines. (Regional Fisheries Attaché, U.S. Embassy, Copenhagen, Apr. 26, 1968.)

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SALMON CAUGHT NEAR FAROE ISLANDS

The Faroese research vessel "Jens Christian Svabo" has found salmon 30 to 50 miles northeast of the Faroese Island of Fugloy. Salmon previously were not known to occur near the Faroes. Current prices are high.

Using a 600-hook longline, the research vessel took 150 salmon in 2 days. Newspaper reports of this success were quick to point out how profitable the Faroese salmon fishery off the west coast of Greenland has been in recent years. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Apr. 26, 1968.)

## Iceland

EXPORT LEVIES RAISED ON FISHERY PRODUCTS

The Althing (Parliament) approved during the week of Apr. 14, 1968, a bill to amend the 1966 Act on Export Levies on Fishery Products. It increases export levies on uncured salted fish, frozen lobster, capelin oil and meal, and salted herring.

The levy on salted herring was increased from 6 percent of f.o.b. value to 10 percent. Levies on the other fishery products were increased from 530 kronur (IKr. 57 = US$1) per ton to 3.5 percent of f.o.b. value.

Although the increased levy also applies to capelin oil and meal, capelin products are being exempted temporarily from any export levy. Industry has protested the increased rate on salted herring.

The bulk of the increase in export revenue will be allocated to the fishing vessel insurance fund, which has experienced deficits in 1967 and 1968. (U. S. Embassy, Reykjavik, April. 25, 1968.)

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TRIES TO DEPEND LESS ON HERRING

Iceland is trying to lessen its overreliance on herring in recent years. The migrations of herring are highly unpredictable, and the catch is less valuable than cod. So more attention is being paid to the more valuable cod. The cod catch declined by 18.7 percent in 1966 and 22.8 percent in 1967. In April 1968, white fish catches, including cod, were favorable. It is hoped that cod catches will recover to the 1966 level of about 339,000 metric tons.

Weather Hinders Fishing

Very bad weather hindered the fishing industry early in 1968. The outlook for the herring catch will not be discernible until August; the winter season was poor. The herring catch in 1967 fell one-third from 1966.

Government Helps

The fish-processing industry, with its high costs and overinvestment, is being helped by Government subsidies. These are designed to encourage structural rationalization of the

Iceland (Contd.):

industry. A price equalization fund is designed to offset fluctuations in export prices. A few inefficient plants have closed.

The supply of raw material to processing plants is uncertain. Another factor to watch will be the direction of demand for and export prices of processed products. In 1967, export prices for herring oil fell 20 percent, herring meal 15 percent, and frozen fish fillets 16 percent. Frozen fish prices have improved only slightly over their earlier lows of this year. Fish meal is still low. Fish oil is at an all-time low. (U.S. Embassy, Reykjavik, May 9, 1968.)

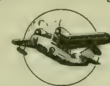
## Poland

### TRAWLER COLLIDES WITH U. S. TANKER

In late evening of May 18, 1968, during a storm, the Polish stern trawler "Barwena" (1,370 gross tons) collided with the U.S. tanker "Texaco, Illinois" 77 miles (39° N. and 73° W.) off Cape May, New Jersey. Barwena's hull was split by a 100-foot-long gash. Because her escaping fuel (capacity over 300 metric tons) made her lighter, she made it to Philadelphia. Three crew members were hospitalized with light injuries. The Barwena had left Halifax, Canada, on May 7. The U.S. tanker was not damaged seriously.

Barwena's Catch

During a surveillance flight by the U.S. Bureau of Commercial Fisheries on May 17, 1968, the Barwena was sighted 55 miles southeast of Long Beach Island off New Jersey. This was not far from her position a day later when she collided. She was fishing for mackerel and herring. About 100 metric tons of processed products (frozen fillets and fish meal) were obtained in about 1 week. Two other Polish stern trawlers and 6 side trawlers, 1 East German, and 3 Soviet fishing vessels were sighted nearby.



## Yugoslavia

### DOCUMENTARY ON "FISHERMEN OF TACOMA" PLANNED

In cooperation with the U. S. Information Agency (USIA), the Yugoslav television system plans to make a documentary film on the fishermen of Washington State. The subject will be the Yugoslavs who migrated to the U. S. and are now Pacific fishermen.

The Yugoslav TV team will shoot scenes of fish-catching techniques, vessels, and distribution from ocean to markets.

### VORACIOUS IMPORTED SNAILS CLEAR U. S. LAKES

Two kinds of voracious fresh water snails from South American rivers are clearing United States lakes by devouring submerged weeds such as elodea, southern niad, coontail, pondweed and certain algae. Marisa, a native of Colombia and Venezuela, can tolerate highly polluted water. It would have to be restricted in certain areas of the world, however, for it also devours rice, watercress and water chestnut. The other weed-eating snail, Pomacea australia, from Brazil, can survive colder climates than Marisa, and eats aquatic plants even more vigorously.

According to researchers of the U. S. Department of Agriculture's Research Station at Fort Lauderdale, Florida, three ponds in southern Florida were stocked in 1965 with hardy Marisa cornuarietis snails--8,000 snails per acre. One year later, the ponds were free of submerged weeds and continued clear. (Reprinted with permission from "Science News," weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

# LATIN AMERICA

## Peru

### FISH MEAL CONSORTIUM TO BEGIN BULK SHIPMENTS

Bulk shipments of fish meal were scheduled to begin in April 1968, according to the Peruvian fish meal Consortium. The first shipment by chartered vessel would be about 12,000 metric tons. Plans call for 120,000 tons to be shipped this year, with costs reduced by $7 a ton.

The Consortium, together with California Pellet Meal Co. and Monsanto, began shipments of bulk pelletized meal in 1963. Shipments were stopped due to the critical industry situation at that time. Apparently, the Consortium was spurred by plans of Pesquera Delphin to begin pelletized fish meal shipments. It is beginning bulk shipments to stay in the running. Plans are for bulk meal to be transported in metal cylinders from factory to launches, ferried out, and dumped directly into the holds of transport vessels.

* * *

### REPORT ON FISH MEAL INDUSTRY

On April 24, 1968, the Peruvian Government set the anchovy catch limit for the 1967/68 season at 9.5 million metric tons. It announced the season's closing date as May 31. It was estimated that this catch might produce close to 1.7 million tons of fish meal.

Shipments in the first quarter were good but may have slowed in April. Stocks continue high. Fish oil production was good in the first quarter. Fishing generally has been good, although heavy fog in certain areas along coast has hampered fishing.

#### 1967/68 Anchovy Season

At the rate of fishing in early May, it was predicted that the 9.5-million-ton-mark might be reached before May 31. The government did not state whether the tonnage limit or date was the crucial factor.

#### Production

Fish meal production from Sept. 1, 1967, to March 31, 1968, was 1,416,347 metric tons. The additional authorized catch of 1.5 million tons of catch could add roughly 270,000 tons of fish meal. This would bring season's total close to 1.7 million tons.

#### Shipments

In 1967, fish meal shipments were 1,560,900 metric tons. For the fishing season that opened Sept. 1, 1967, shipments reached 1,098,788 tons on March 31. Shipments, which were very good in first-quarter 1968, slowed during April.

#### Stocks

During the closed season (Feb. 17 to March 17, 1968) stocks were drawn down but began to rise when fishing resumed. Stocks on Jan. 30 were 688,943 tons; on Feb. 29, 689,039; on Mar. 31, 671,323. Stocks on May 31, 1968, were expected to be well over 700,000 tons. However, June, July, and August will be closed for fishing; September usually is a poor month for fishing; so even moderate shipments during this period should draw down stocks to comparatively low levels by the time fishing hits its stride about October 1.

#### Sales by Marketing Zones

Fish meal sales by marketing zones for first-quarter 1968 show a marked increase in sales and important changes in the percentage distribution of these sales by zones.

| | 1968 | | 1967 | |
|---|---|---|---|---|
| | 1st Qtr. | % | 1st Qtr. | % |
| U.S.A. & Canada. . . | 132,645 | 24.1 | 112,564 | 33.8 |
| Latin America. . . . | 31,455 | 5.7 | 14,600 | 4.4 |
| Far East. . . . . . . . | 52,040 | 9.4 | 10,827 | 3.2 |
| Eastern Europe . . . . | 87,820 | 16.0 | 66,077 | 19.8 |
| Western Europe . . . . | 134,186 | 24.4 | 76,483 | 23.0 |
| West Germany . . . . | 112,239 | 20.4 | 52,685 | 15.8 |
| Total. . . . . . . | 550,385 | 100 | 333,236 | 100 |

#### Exports of Semirefined Fish Oil

In first-quarter 1968, 46,137 metric tons of semirefined fish oil were exported--to West Germany, 13%; Colombia, 11.1%; Denmark, 9.2%; Ecuador, 0.7%; The Netherlands, 63.4%; and Great Britain, 2.6%.

#### Exports of Crude Fish Oil

During the first three months of 1968, 40,817 metric tons of crude fish oil were exported. The Netherlands took 58.7 percent; Germany was second, 36.1 percent. (U. S. Embassy, Lima, May 2, 1968.)

## Brazil

### FISHING INDUSTRY PROTESTS SOVIET FISHING OFF BRAZIL

On April 9, two Brazilian shrimp trawlers fishing off Sao Francisco Island in southern Brazil, south of Sao Paulo, were "interfered with" by Soviet fishing vessels. Companhia Brazileira de Pesca, which owns the trawlers, protested to the Brazilian Air Force, Navy, and Ministry of Foreign Affairs.

At the same time, the company asked the Sao Paulo Federation of Industries to support its protest and request that the government organize better surveillance of "Brazilian territorial waters" to protect fishery resources. At an April 18 meeting of the Federation's Board of Directors, it was decided to bring "the gravity of the incident to the attention of competent Brazilian authorities." (U. S. Consulate, Sao Paulo, Apr. 23, 1968.)

* * *

### PUSHES DEVELOPMENT OF FISHERIES

In the 10 months of its existence, the government has approved 42 projects involving US$12 million. This was announced in Sao Paulo by Admiral Antonio Maria Nunes de Souza, head of the Brazilian Fisheries Development Agency, Superintendencia do Desenvolvimento da Pesca--SUDEPE.

SUDEPE is going to acquire 4 fishing vessels equipped with echo-sounding and other modern fish-finding equipment to carry out research and locate fish off Brazil. The Admiral predicted that Brazil shortly would increase her annual catch of 150,000 metric tons to 400,000 tons through SUDEPE's efforts. By 1972, the annual catch would be about 2 million tons. Fishing industry projects already approved call for adding 110 vessels to the fishing fleet.

#### Predicts Progress

He declared that within a few years fish would become the basic source of protein for Brazilians. He predicted that within 2 to 3 years annual per-capita consumption would increase from the present 9.9 lbs. to 26 lbs.

Some businessmen appear interested in investment possibilities. However, they are realistic and critical. One Sao Paulo businessman asked the Admiral what sort of research is being done to determine the fish potential of Brazilian waters. He replied that such research was projected--but that Brazilians knew there was a great potential because they could see foreign vessels working off the coast. (U. S. Consul, Sao Paulo, Apr. 30, 1968.)

## Chile

### SOVIETS AID CHILE'S FISHERIES

Three Soviet technical fishery experts left Santiago in March 1968 after a month's study of the Chilean fishing industry. The visit was arranged under the January 1967 Soviet-Chilean Agreement. The Chilean press says technicians will submit reports to their respective governments on the results. The Soviet team is expected to recommend negotiation of a technical and research assistance agreement under which the Soviets might help develop Chilean fisheries. This would include aid in electrical fishing, exchange of scientific information, feasibility studies on how to improve existing, or construct new, fishing ports, and exchanges of fishery experts.

#### Several Agencies Involved

The Soviet team arrived in Santiago Feb. 27. It was headed by Evgenii Grinko, Director of the Moscow All-Union (Federal) Institute for Design and Construction Projects in the Fishing Industry. The sponsoring agency was the Fisheries Division of the Ministry of Agriculture. Its director participated in the FAO-sponsored Seminar on Fish Behavior in the USSR in October 1967.

The Fisheries Division arranged for contacts with other government agencies, primarily the Government Development Corporation, or CORFO, and with the Fisheries Development Institute, a Chile/FAO organization.

After meetings at Santiago, the Soviet team visited ports and adjacent processing plants in northern Chile (Antofagasta, Arica, etc.); the Golfo de Ancud in Central Chile (visited Ancud, Castro, Chonchi, Calbuco, and Puerto Montt fishery ports and plants); and the southernmost part of Chile where, at Punta Arenas, the "centolla" (king crab) industry was visited.

Chile (Contd.):

A rich catch of anchovies flows into hold of Iquique-based boat. The fish are abundant off Northern Chile and are converted into meal and oil for export. (Photo: R. Saunders/Scope)

Soviets Used Chilean Ports

During the team's visit, a Soviet fishery research vessel ("SRTM-8459") from the Pacific Institute for Fisheries and Oceanography arrived at Valparaiso. It was open to the public. Often in the past, the Soviets have used Valparaiso and Puerto Montt to resupply their oceanography and fishery research vessels operating in the southeastern Pacific and Antarctic.

2 Views of Soviet Intentions

Government officials imply that the Soviets may put money and technical assistance into a "centolla" cannery--and assist in enlarging some existing fish-processing plants and ports. However, the Santiago fishery trade and industry circles have a different opinion: They believe the main purpose of any Soviet aid would be to obtain permission to use Chilean ports as supply bases for Soviet fleets operating in southeastern Pacific; and, possibly, even to process and market catches (with Chilean permission) within the 200-mile fishing limits.

* * *

OUTPUT AND EXPORT OF
FISH MEAL & OIL, WHALE MEAL & OIL

Chile's fish-meal production during 1967 was 163,369 metric tons, down 26.2 percent from 221,334 metric tons in 1966. About 123,752 metric tons of 1967 production, mainly anchovy meal, were produced in the north.

Production of fish oil in 1967 was 10,426 metric tons; 9,899 metric tons were produced in the north. Fish oil production decreased 53.9 percent from the 22,625 metric tons in 1966. Trade groups estimate whale and sperm oil production at about 7,200 metric tons, somewhat lower than 1966.

During 1967, 102,705 metric tons of fish meal worth US$12,026,058 were exported. As usual, the principal importers were the U.S., West Germany, and the Netherlands.

Whale and sperm oil production in 1967 was somewhat lower than 1966. (U. S. Embassy, Santiago, Apr. 15, 1968.)

## Ecuador

SEEKS FINANCING TO
MODERNIZE FISHING INDUSTRY

Ecuador's Planning Board will seek World Bank financing for the first stage of a 10-year plan to expand and modernize the fishing industry.

The first stage (5 years) includes: (a) construction of 12 purse-seine-type tuna vessels, presumably equipped with refrigeration, (b) location and feasibility studies for 2 fishing ports, and (c) construction of port facilities in Manta fishing port. The cost of the 12 vessels is estimated at US$3.3 million. Feasibility studies should cost $300,000, and construction $242,000. Also, technical assistance and training of crews will cost $327,000.

Ecuador (Contd.):

The First Stage

During the first stage, the Planning Board intends to act as promoter of the project with necessary assistance from the National Financing Corporation and the Ministry of Public Works.

The Corporation already has sent a representative to the U. S. to discuss with spokesmen from the American tuna industry possible use of purse-seiners in Ecuador. The first step probably would involve bringing U. S. flag vessels to Ecuador on a temporary basis for training purposes; the resulting catches would be sold to local processing plants.

The Second Stage

If the first stage proceeds successfully, the Planning Board intends to go ahead with an even more ambitious second stage. This calls for: (a) construction of another 12 purse-seiners, (b) acquisition of a fleet of trawlers and 2 lobster vessels, (c) renovation and modernization of existing fleet, (d) studies of planned fishing ports, and (e) construction of 2 fishing ports. The purse-seiners probably will cost the same as the first 12. Port construction will be \$11.3 million, improvement of existing fleet \$500,000, and purchase of 2 lobster boats \$10,000. Final studies for a trawler fleet are incomplete; cost estimates are not available.

According to the Planning Board, the application to the World Bank for financing the first stage is being handled expeditiously. Bank spokesmen have said a loan contract could be signed in July or August 1968.

## Argentina

SOVIET FLEET LEAVES ARGENTINE 200-MILE ZONE

On Apr. 1, 1968, the Soviet fishing fleets withdrew from the Patagonian Shelf waters claimed by Argentina--up to "200 miles from low tide"--in its Jan. 4, 1967, decree. On Nov. 24, 1967, Argentina made known her regulations for foreign fishing in the 200-mile zone: exorbitant fishing license fees (US\$10 per each net registered ton every 4 months) and other restrictions.

Several Nations Negotiate

Japan, USSR, Brazil, Spain, and West Germany, which fished in the 200-mile zone, began to negotiate with Argentina about the new regulations. The latter delayed enforcement until April 1, 1968.

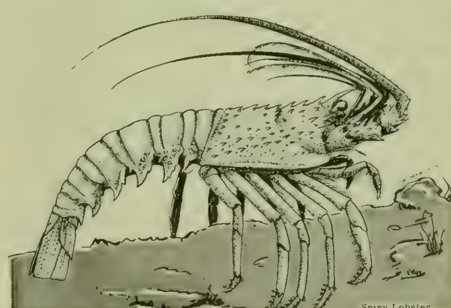
USSR Refuses to Pay

The months-long negotiations with the Soviet Union broke down when the Soviets refused to pay license fees. When Argentina finally began to enforce regulations, all Soviet fishing and support vessels withdrew north and east of the 200-mile limit.

## Honduras

THE SPINY LOBSTER FISHERY

Three firms constitute the spiny lobster industry in Honduras: Alimentos Marinos Hondurenos, S.A. of Puerto Lempira, Department of Gracias a Dios; Industria Pesquera Hondurena of Guanaja, Bay Islands; and Caribbean Products Company, Santos Guardiola, Bay Islands.



Spiny Lobster (Panulirus penicillatus)

Exports for 1963-67 were:

| Year | Lbs. | Value US$ |
|---|---|---|
| 1967[1] | 21,142 | 5,602 |
| 1966 | 180,797 | 63,798 |
| 1965 | 310,404 | 117,237 |
| 1964 | 35,426 | 17,352 |
| 1963 | 30,941 | 12,700 |

1/ 9 mos. only.

Honduras (Contd.):

Catch data are unavailable, but it is estimated that over 90 percent is exported to the U. S., almost entirely frozen.

Data Scarce

Little information is available on the number of fishermen or vessels employed. Alimentos Marinos Hondurenos, S.A. reportedly has 11 vessels, 6 in operating condition.

Fishermen work the North Coast (Caribbean) regions of Honduras between Puerto Lempira, the Honduran Bay Islands, and the Swan Islands. The catch on the South Coast is insignificant.

The Tegucigalpa retail price for spiny lobster ranges from US$1.85 to $2.50 a pound. Prices are considerably lower in the North Coast-Bay Islands region. (U. S. Embassy, Tegucigalpa, May 9, 1968.)

## Nicaragua

THE PACIFIC COAST FISHERIES

Shrimp fishing for export continues as the most important fishery on Nicaragua's Pacific Coast. Production has trebled since the principal shrimp packing company was reorganized about 2 years ago.

Alimentos Interamericanos, S.A. (ALINSA) of Corinto is an associate of Interamerican Foods, Inc., of Brownsville, Texas. Capital is 50 percent Nicaraguan, 50 percent U. S. Under new ownership and management, the plant, located on an excellent deep-water harbor, has been modernized and placed into full production. It has 2 docks, one for unloading and net repair, the other for icing, fueling, and servicing the boats. A conveyor carries the shrimp from dock to packing room, which is equipped with mechanical sorters. Peeling and deveining are done by hand. The modern freezer and cold storage are in the same building as the packing room and offices.

ALINSA's Fleet

The fleet fishing for ALINSA consists of 30 U. S. trawlers, most from Brownsville, Texas. Eighteen are company-owned and 12 are private boats belonging to 3 owners. Twenty are ice boats and 10 are equipped with brine refrigeration. Another fleet of 10 Panamanian vessels plans to operate seasonally at Corinto. The fishing grounds are close; at times, the trawlers can start fishing within a half hour of port. Ten-day trips are usual.

5-Lb. Boxes

Most ALINSA production is in 5-pound boxes, heads-off, shells-on. However, sizes smaller than 15 to the pound are packed, peeled, and deveined, individually quick frozen, when the market demands it--on orders from Brownsville.

Formerly, most production was shipped by refrigerated steamer to Houston. Following the long-delayed permission to transit Mexico, early in 1968, most shipments now are direct to Brownsville via refrigerated truck-trailers in 5 days.

Booth Builds Plant

Booth Nicaragua, S. A., which operates the largest shrimp plant on the Atlantic Coast, is beginning to build a modern prefabricated plant at San Juan del Sur. The fleet is being assembled; 4 boats were ordered in Mexico, 4 in the U. S., and more are to come.

Pacific Coast Shrimp Landings

| | 1967 | 1966 | 1965 |
|---|---|---|---|
| | . . (1,000 Lbs. heads-off weight) . . | | |
| Production: | | | |
| White . . . . . . . | 711 | 1,072 | 342 |
| Brown . . . . . . . | 102 | 5 | 139 |
| Pink . . . . . . . | 641 | 607 | 230 |
| Sea-bobs, etc. . . . | 460 | 348 | 2 |
| Total . . . . . . | 1,914 | 2,032 | 713 |
| Fishing Effort: | | | |
| Avg. number boats fishing . . . . . . | 28 | 18 | 12 |
| Total boat-days of fishing . . . . . . | 4,352 | 2,969 | 1,903 |

Pacific Coast shrimp production increased remarkably following the Corinto plant changes in 1966. Corinto has been noted for its large white shrimp; this high-priced product is the fishery's mainstay. Other species, however, account for a large part of the production. During 1967, the fishing for white shrimp was very poor all along the coast from southern Mexico to El Salvador. The scarcity was reflected in Nicaragua, where a great increase in fishing effort could not maintain the catch at anywhere near the record 1966 level. (Regional Fisheries Attaché, U. S. Embassy, May 5, 1968.)

# ASIA

## Japan

### 1967 FISHERY CATCH SET RECORD

Preliminary data compiled by the Ministry of Agriculture and Forestry indicate the Japanese fishery catch in 1967 reached a record 7.7 million metric tons (excluding whales). This was 8 percent more than 1966's record 7.1 million tons. The high output was attributed to the abundant catch of Alaska pollock and ocean perch in the Bering Sea, and to the increased yield of seaweed. In the tuna fishery, indications were that total 1967 landings would be about the same as, or slightly below, 1966 landings. ("Suisan Keizai Shimbun," Apr. 15, 1968.)

| | Landings | |
|---|---|---|
| | 1967 | 1966 |
| | . (1,000 Metric Tons) . | |
| Marine fisheries. . . . . . . . . . | 7,110 | 6,560 |
| Culture in shallow water . . . . . . | 450 | 410 |
| Inland water fisheries . . . . . . . . | 100 | 100 |
| Culture in inland waters . . . . . . | 40 | 40 |
| Total . . . . . . . . . . . . . | 7,700 | 7,110 |

* * *

### CANNED FISH PRODUCT EXPORT TARGETS SET FOR FY 1968

On April 19, the government set export targets for fiscal year 1968 (April 1968-March 1969) of 23,946,000 cases worth US$195 million.

| Canned Product | Fiscal Year 1968 | | Fiscal Year 1967 | |
|---|---|---|---|---|
| | Export Target | | Actual Exports | |
| | Quantity | Value | Quantity | Value |
| | No. Cases | US$ 1,000 | No. Cases | US$ 1,000 |
| Tuna. . . . . . | 6,150,000 | 55,575 | 6,119,584 | 55,164 |
| Salmon . . . . | 1,125,000 | 37,125 | 1,636,929 | 54,624 |
| Crab. . . . . . | 401,000 | 9,845 | 458,748 | 11,979 |
| Sardine . . . . | 200,000 | 1,560 | 149,847 | 1,148 |
| Saury . . . . . | 400,000 | 2,480 | 247,927 | 1,484 |
| Mackerel . . . | 550,000 | 3,660 | 437,196 | 3,257 |
| Other fish . . . | 7,310,000 | 41,640 | 6,887,520 | 39,198 |
| Tangerines . . | 4,650,000 | 28,788 | 4,948,827 | 30,983 |
| Other fruits . . | 400,000 | 2,355 | 506,051 | 2,998 |
| Pet food . . . . | 1,600,000 | 5,440 | 1,541,666 | 5,227 |
| Others . . . . . | 1,160,000 | 6,259 | 1,112,362 | 5,445 |
| Total. . . . | 23,946,000 | 194,727 | 24,046,657 | 211,507 |

The export target is almost the same as the amount actually exported in FY 1967. That totaled 24,046,657 cases worth $211,507,000.

The canned salmon target was reduced 31 percent from last year's actual exports because of the uncertain pound sterling. ("Suisancho Nippo," Apr. 20, 1968.)

* * *

### EXPORTS OF FISHING VESSELS ROSE IN 1967

Japanese exports of fishing vessels in 1967 totaled 175--68 more than in 1966--according to the Fisheries Agency.

| Destination | Trawlers | | Purse Seiners | | Long-liners | | Others | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | '67 | '66 | '67 | '66 | '67 | '66 | '67 | '66 | '67 | '66 |
| South Korea | 43 | 35 | 4 | 3 | 6 | 9 | 38 | 4 | 91 | 51 |
| Philippines | 19 | 0 | 2 | 2 | 3 | 1 | 3 | 2 | 27 | 5 |
| Formosa | 3 | 0 | | | 14 | 13 | | | 17 | 13 |
| Hong Kong | 11 | 0 | | | | | 1 | 0 | 12 | 0 |
| Okinawa | 0 | 4 | | | 6 | 12 | | | 6 | 16 |
| Panama | | | | | 3 | 2 | 2 | 0 | 5 | 2 |
| Others | 5 | 8 | | | 7 | 9 | 5 | 3 | 17 | 20 |
| Total | 81 | 47 | 6 | 5 | 39 | 46 | 49 | 9 | 175 | 107 |

South Korea and the Philippines were the leading purchasers of trawlers.

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### 1968 NORTH PACIFIC WHALE CATCH QUOTA SET

The Japanese Fisheries Agency has announced a baleen whale catch quota of 1,001 blue-whale units (BWU) for the 3 fleets licensed for 1968 North Pacific whaling. The quota is the same as 1967's.

| Name of Mothership | No. Catcher Vessels | Whale Catch Quota | | Scheduled Departure Date |
|---|---|---|---|---|
| | | Baleen | Sperm | |
| | | BWUs | | |
| "Kyokuyo Maru No. 2" | 13 | 734 | | May 1, '68 |
| "Tonan Maru" | 3 | 267 | 1,000 | May 13, '68 |
| "Nisshin Maru No. 2" | 8 | | 2,000 | May 12, '68 |

Also, a sperm whale quota of 3,000 whales was allocated. The catch limit for fin whales was reduced by 35 percent of the 1965 catch--to 951 whales. Therefore, the fleets will have to fish for sei whales to complete the remainder of the baleen whale quota. ("Minato Shimbun," Apr. 23; "Shin Suisan Shimbun Sokuho," Apr. 12, 1968.)

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Japan (Contd.):

## ANTARCTIC WHALING SEASON ENDS WELL

The 4 Japanese baleen Antarctic whaling fleets that participated in the 22nd (1967/68) Antarctic Whaling Expedition ended operations on March 20, 1968. All fleets attained assigned targets.

The International Whaling Commission had set an overall catch quota of 3,200 blue-whale units (BWUs). A national quota of 1,493 BWUs was allocated to Japan, 976 BWUs to the Soviet Union, and 731 BWUs to Norway. ("Minato Shimbun," Apr. 13, 1968.)

Production of the Japanese fleets was:

| | "Nisshin Maru" | "Nisshin Maru #3" | "Tonan Maru #2" | "Kyokuyo Maru #3" | Total |
|---|---|---|---|---|---|
| | (No. of Whales) | | | | |
| Whales: | | | | | |
| Fin. . . . . . . | 320 | 44 | 249 | - | 613 |
| Sei. . . . . . . | 1,518 | 1,248 | 1,803 | 2,550 | 7,119 |
| BWUs . . . . . | 413 | 230 | 425 | 425 | 1,493 |
| | (Metric Ton) | | | | |
| Product: | | | | | |
| Fin whale oil . | 8,521 | 4,163 | 8,110 | 8,010 | 28,804 |
| Frozen products | 24,080 | 13,609 | 25,639 | 25,232 | 88,560 |
| Salted products | 458 | 254 | 885 | 353 | 1,950 |
| Meal . . . . . | 372 | 235 | - | 780 | 1,387 |
| Solubles & others | 1,620 | 1,298 | 26 | - | 2,944 |
| Total. . . . | 35,051 | 19,559 | 34,660 | 34,375 | 123,645 |
| | (Percent) | | | | |
| Recovery rate: | | | | | |
| Fin whale oil . | 20.63 | 18.11 | 19.08 | 18.85 | |
| Frozen products | 58.31 | 59.21 | 60.33 | 59.37 | |
| Salted products | 1.11 | 1.11 | 2.08 | 0.83 | |
| Meal & others. . | 4.82 | 6.78 | 0.06 | 1.84 | |
| Total. . . . | 84.87 | 85.21 | 81.55 | 80.89 | |

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## ALLOCATES IMPORT QUOTA FOR HERRING ROE ON KELP

The Japanese Government, which regulates import of herring roe on kelp, has adopted a new policy of allocating import quotas based on value rather than quantity. A quota value of about US$800,000 (160-170 metric tons) will be allocated to trading firms.

The system was adopted to prevent undue competition among these firms and to stabilize the market price.

### First Imported in 1962

Herring roe on kelp, harvested only along the Alaskan coast, was first imported into Japan in 1962. Competition among about 30 trading firms forced up purchase prices. The result was that Alaskan pickers, first paid only about 6 cents a pound, received up to $1.20 a pound in 1967, a twentyfold increase. On the retail market, the price jumped from about US$3.16 a pound in 1963 to about $5.68 a pound in 1966. The Government hopes that importers will agree on setting a maximum import price of $2-2.10 a pound c.i.f.

Fierce trader competition not only pushed prices up but created disorder in the harvest areas. In 1962, about 150 Alaskans were collecting the egg-laden kelp; by 1967, the number had swollen to 1,800-2,000. The supply and demand for this unique product are limited by 2 factors: the harvest is tightly controlled by Alaska, and the market is confined to high-class restaurants in Japan and to Japanese-American consumers on U.S. mainland and Hawaii. ("Suisan Keizai Shimbun," Apr. 16, 1968.)

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## INCREASE SHRIMP FISHING IN CARIBBEAN

Several Japanese fishing companies are increasing their investments in Caribbean shrimp fishing. Of 40 shrimp trawlers ordered from U. S. boatyards in 1967 by Japanese companies, 5 were delivered and operated from Surinam, Dutch Guiana, in Nov. 1967.

By mid-Jan. 1968, 6 were fishing from Guyana (formerly British Guiana) and 29 more will be by fall. Crews of vessels fishing from Guyana will be Japanese, with one Guyanese aboard each vessel. Processing will be done by Guyana merchants, although processing vessels may be brought in from Japan when the fleet is up to full strength.

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## TO LONG LINE TUNA OFF PERU

The Taiyo Fishing Co. plans to conduct exploratory tuna long-lining off Peru this year with its newly built, 345-gross-ton, "Azuma Maru No. 31." The long-liner was scheduled to depart around the end of April 1968 on a one-year cruise.

One-half the expedition's cost, about US$178,000, will be subsidized by the Government under its $1.59-million fiscal year 1968 fishing-ground development program. ("Suisancho Nippo," Apr. 16, 1968, and other sources.)

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Japan (Contd.):

## SHRIMP FLEET OFF NORTHEAST SOUTH AMERICA

A fleet of 20 Japanese shrimp vessels is fishing off the coast of the Guianas, northeast South America. These 20 are part of the 35 vessels belonging to 7 fishing firms licensed in 1967 by the Japanese Fisheries Agency to explore for shrimp.

One firm, the South Pacific Fisheries Cooperative Association, has 3 U. S.-built double rigs in operation; 2 other vessels are scheduled to join the fleet shortly.

The shrimpers, based at Georgetown, Guyana, are fishing 20-30 miles off the the coast. The shrimp resource is believed to be stable.

Nichiro Fishing Co. has five 99-ton double rigs reportedly producing an average 300-400 pounds of headless shrimp per vessel per day. Also, Nichiro is operating a shrimp mothership fleet: the 1,000-ton-class mothership "Kuroshio Maru No. 22," six 260-ton shrimp trawlers, and one 90-ton double rig. This fleet originally was licensed to operate at the mouth of the Amazon River, but it is also permitted to fish off the Guianan coast off season.

### Import Prices in Japan

Guianan shrimp is shipped to the U. S. and Japan. Import prices in Japan are generally similar to those paid for Mexican shrimp. Prices recently quoted on Japanese market were:

| Count (Heads Off) | Wholesale Price Per 5-Lb. Block |
|---|---|
| | US$ |
| Under 12 | 9.03 |
| 12 - 15 | 8.89 |
| 16 - 20 | 7.92 |
| 21 - 25 | 7.44 |
| 26 - 30 | 6.39 |

("Suisan Tsushin," Apr. 22, 1968, and other sources.)

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## LARGE STERN TRAWLER TO FISH GULF OF ALASKA

The 4,200-gross-ton, 4,400-hp. diesel, stern trawler "Kashiwada Maru," built at Usuki Shipyard, was scheduled to be launched in late May 1968. Completion of construction is set for late July.

When delivered to its owners, the trawler will be assigned to the Gulf of Alaska. There it will fish primarily for Pacific ocean perch, but it will also trawl for Alaska pollock and other bottomfish suitable for producing minced fish meat. ("Suisan Keizai Shimbun," Apr. 17, 1968.)

* * *

## RESEARCH VESSEL TO WORK IN SOUTH PACIFIC

The Japanese Government-owned research vessel "Kaiyo Maru" (3,200 gross tons) was scheduled to depart May 15, 1968, on a 90-day research cruise to the South Pacific Ocean. The vessel will survey skipjack and other resources in the South Pacific off New Caledonia and New Zealand. ("Shin Suisan Shimbun Sokuho," Apr. 20, 1968.)

* * *

## SUMMER ALBACORE FISHERY REPORTED SLOW

The summer albacore fishery off the Japaese home islands, which normally begins to pick up in early May, continued slow in late April. This was due to the delay in the warming of waters in all fishing grounds.

Catches of large albacore by bait boats off northern Bonin Island were unusually poor. Some vessels fishing off Aogashima, Shizuoka Prefecture, were taking around 6 metric tons of small albacore per day. Bait boats fishing for skipjack off Japan also were encountering poor fishing. ("Katsuo-maguro Tsushin," May 1, 1968.)

* * *

## TRAWLER TO FISH OFF U. S. EAST COAST

The 1,500-gross-ton stern trawler "Akebono Maru No. 51," owned by Nichiro Fishing Co., was scheduled to depart Japan May 7

Japan (Contd.):

to explore off U. S. east coast. The vessel will proceed to the western Atlantic via the Panama Canal and survey the waters from New York to Florida for new trawling grounds.

Second Vessel Off Virginia

A second exploratory vessel, "Kiso Maru" (2,500 gross tons), belonging to Nihon Suisan, arrived off the U. S. east coast in early April. It was reported fishing off Virginia. Its catch to late April was about 200 tons of bottomfish, primarily butterfish, with squid and other species mixed in. ("Suisan Tsushin," May 1, 1968; other sources.)

* * *

LARGE TUNA SEINER TO FISH OFF WEST AFRICA

The newly built 499-gross-ton Japanese purse seiner "Gempuku Maru No. 82" departed Nagasaki on May 2 for the tuna grounds off West Africa. The vessel, owned by Toyo Gyogyo Fishing Co., will proceed to Abidjan, Ivory Coast, via the Panama Canal. It will join Nichiro Fishing Co.'s purse seine fleet now fishing in the Gulf of Guinea.

The Gempuku Maru

The Gempuku Maru is equipped with U. S.-type power block. It is one of the 2 largest one-boat seiners built in Japan; the other is the "Hakuryu Maru No. 55" (500 gross tons) built in 1967 for the West African purse-seine fishery. Its main specifications are: length, 157.8 feet; width, 32.1 feet; depth, 15.7 feet; main propulsion, 2,000-hp. deisel engine; refrigeration system--brine freezing with 60-ton daily freezing capacity and 300-ton storage capacity; maximum speed--14.5 knots; crew--25.

A Second New Seiner

On April 27, another new one-boat seiner, "Shofuku Maru" (100 gross tons), left Japan to join Nichiro's fleet off West Africa. This brings to 7 (4 two-boat and 3 one-boat units) the fishing units in Nichiro's purse-seine operation off West Africa. ("Minato Shimbun," Apr. 25, May 3; "Suisan Tsushin," May 1.)

日本

## South Korea

FLEET OFF ALASKA

Despite technical problems off Japan, the Korean fishing fleet made it across the North Pacific in 11 days. On May 5, the master of the South Korean mothership "Sam Su No. 301" notified U. S. authorities that his fleet was off Rat Islands in the western Aleutians. He said it would operate in the Bering Sea "from May to August" 1968.

Less than 24 hours after arriving off Alaska, the South Koreans requested to enter U. S. territorial waters to make repairs. Request was granted to enter Nazan Bay (off Atka Island) from noon, May 7, through noon, May 9.

Engine Troubles

According to Japanese sources, the 7 fishing and support vessels of South Korea, which sailed from Pusan on April 24 for Bering Sea fishing, had been reported earlier lying off Urukawa (east of Cape Erimo in southwestern Hokkaido) due to engine troubles.

## Malaysia

SHRIMP FISHING OFF SARAWAK RESUMED

After unsuccessful attempts in 1962-63, commercial shrimp trawling has been resumed off Sarawak by Tropical Seafoods (Sarawak) Co. This is a joint venture of the Japanese Tokyo Shrimp Co., Ltd., and a local businessman (Ong Kee Hui). The company operates 7 trawlers, each equipped with modern equipment--fish locators, quick-freezing plants, cold-storage holds, and desalination plants.

Largest Plant Built

Systematic studies of shrimp abundance were encouraging, so the company decided to build an up-to-date shore plant. It is the largest of its kind in Southeast Asia. It comprises 3 contact freezers for quick-freezing shrimp (capacity 1,800 lbs. every 3 hours); a semi-airblast freezer for deep-freezing fish (capacity 16,000 lbs. every 18 hours); a fishmeal plant (production 2 metric tons every 8

Malaysia (Contd.):

hours); and a cold storage (capacity 360 metric tons). The fish-meal plant also will produce 8,000 liters of fish oil per hour as a by-product.

Boost to Economy

The entire venture will give a much-needed stimulus to the local economy. It will help raise the per-capita income of Sarawak fishermen. It will enable Sarawak State to save considerable amounts of foreign currency--because her imports of fresh and frozen fish and fish meal will be greatly reduced, if not eliminated.

The plant is expected to be in full operation by 1970. Exports of frozen shrimp and fish are being considered for that date. (U. S. Consulate, Kuching, May 3, 1968.)

## Pakistan

NEW FISHERY DEVELOPMENT PROJECTS APPROVED

Two new fishery-development projects were approved recently by the Executive Committee of Pakistan's National Economic Council. The projects are: sea exploratory fishing and oceanographic research in West Pakistan, and marine fisheries exploration and research in East Pakistan. (U. S. Embassy, Rawalpindi, May 13, 1968.)

Small fish and prawns are carried in mat baskets onto beach 11 miles from Karachi, where they are sold. (FAO Photo)

# SOUTH PACIFIC

## Australia

APPROVES JAPANESE PART IN JOINT SHRIMP VENTURES

On April 25, the Australian Government licensed 7 Australian shrimp firms to fish for shrimp in the Gulf of Carpentaria off the Northern Territory. Three of the 7 involved joint ventures with Japanese interests. The Japanese firms are Taiyo Gyogyo, Kyokuyo Hogei, and Nampo Kaihatsu.

Foreign Vessels & Crews

Reportedly, the 3 joint ventures are permitted to employ foreign vessels and crews, provided they obtain prior approval from the Australian Government. They also are obligated to replace foreign nationals and vessels by Australian nationals and vessels within a prescribed period. ("Shin Suisan Shimbun Sokuho," May 1, 1968.)

## 1967 U. S. Trust Territory Fishery Developments

The major exporter of fish was the tuna cannery, a subsidiary of a California tuna canner, which started fishery operations in Palau in 1964. This company continued to train Micronesian fishermen. Other Micronesians were being trained in long-line fishing in Hawaii.

Permission was given to this company and to a second, a subsidiary of another California tuna canner, to conduct feasibility surveys in Truk for the purpose of expanding commercial fishing operations.

Exports Increase

Exports of fish by small private fishermen increased due to better freezing and storage facilities. Reef fish were marketed in the territory and in Guam by the Palau and Ponape Fishermen's Cooperatives.

Total revenue from the fishermen's exports during 1967 was US$93,510, not including commercial export. This was an increase of $15,408 over 1966. ("1967 Annual Report, Trust Territory of the Pacific Islands.")

# AFRICA

## Malagasy

### SHRIMP FISHING INCREASES

Malagasy has granted provisional rights to a Lebanese firm to fish for shrimp off the northwest coast. At present, 5 Japanese-made vessels operated by SOMAPECHE (Société Malagasy de Pêcherie) and one U. S.-made vessel run by SIPAM (Société Industrielle de Pêche à Madagascar) are fishing there.

Using 2 French-made fishing vessels, the Lebanese firm will seek shrimp sources; if successful, it will form a joint-ownership company with the Government of the Malagasy Republic. (U. S. Embassy, Tananarive, Apr. 13, 1968.)

## Dahomey

### EXTENDS TERRITORIAL WATERS TO 12 MILES

On March 7, 1968, Dahomey's Council of Ministers extended the nation's territorial waters to 12 nautical miles from the low-water mark over which Dahomey claims exclusive rights to exploit minerals. (U. S. Embassy, Cotonou, Apr. 9, 1968.)

## Gulf of Guinea

### REPORT ON GUINEAN TRAWLING SURVEY

"Report on the Guinean Trawling Survey," a 3-volume trawling survey of the Gulf of Guinea from Cape Roxo, Senegal, to the Congo River, was published recently. It was the result of Joint Project 19 of the Scientific, Technical and Research Commission of the Organization of African Unity (STRC/OAU), Lagos, Nigeria, and the Agency for International Development (A.I.D.), Washington, D. C.

#### Survey's Purposes

Joint Project 19 investigated the fish potential of the West African Continental Shelf floor. Its purposes were to assess the composition of exploitable fish stocks, compare productivity in different fishing areas, and to locate areas most favorable to commercial trawling. The conclusion: "Provided that the local fishing fleets become more efficient, it is considered that both distant-water and local landings could develop in view of the enormous potential demand from the West African population for cheap animal protein."

#### To Purchase Report

The report, in English, is available at US$35 a set from the Publications Office, OAU/STRC, Publications Branch, B.P. 878, Niamey, Republic of Niger. The price includes surface shipment. Air shipment can be arranged at additional cost. The set is not available in separate volumes.

| | | |
|---|---|---|
| volume I | - | General Report, 828 pp. |
| volume II | - | Environmental Charts, 530 pp./240 charts |
| volume III | - | Data Report, 552 pp. |

## Nigeria

### BUYS FISH FROM USSR

Nigerian firms continue to buy frozen fish from East European and Soviet fleets that fish close to Nigerian shores. No official data are available on the amount and value of these imports. The reason is that Nigeria does not technically consider these as imports--apparently because their "place of origin" is the sea, not a foreign port.

#### About 20,000 Tons

It is estimated, however, that Lagos firms purchased, in 1967, about 20,000 metric tons of frozen fish from Soviet, Polish, and Bulgarian fleets. (U. S. Embassy, Lagos, May 11, 1968.)

Soviet trade statistics show that the USSR exported to Nigeria 3,100 metric tons of fish in 1963, 9,700 in 1964, and none in 1965 and 1966. The data for 1965 and 1966 show only fish meal exports of 400 tons and 600 tons, respectively.

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Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

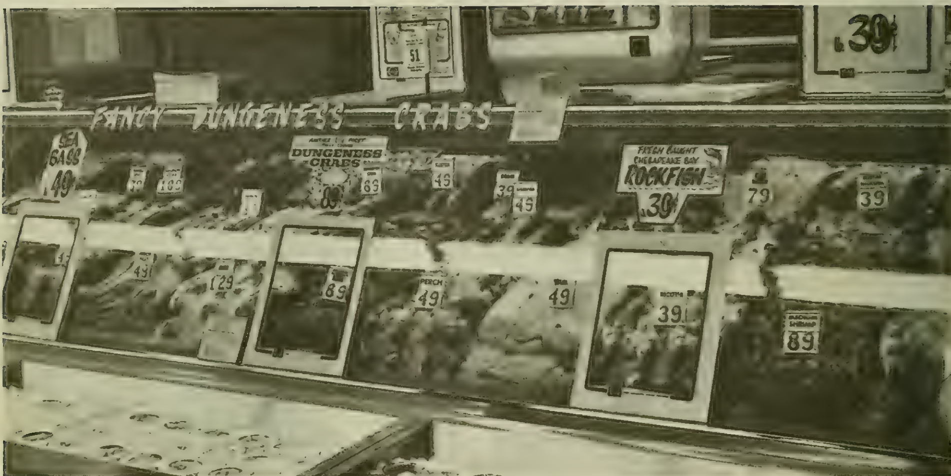
As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.


UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. Fish and Wildlife Service

BUREAU OF COMMERCIAL FISHERIES

# BCF Retail Workshops




The Bureau of Commercial Fisheries conducts seafood merchandising and quality control workshops for retail store personnel. The workshops include information on merchandising, quality control, product display, and suggested methods of seafood cookery. For further information, contact your nearest BCF Marketing Office.